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THE ORIGIN OF THE CELLS FOUND IN THE DEEPER LAYER OF THE STRIA VASCULARIS.

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(With five illustrations on Plates A and B.)

INTRODUCTION.

THE stria vascularis occupies the outer wall of the ductus cochlearis between the attachment of the membrane of Reissner above and the prominentia spiralis below. A very rich vascular supply indicates an important physiological function for this structure. The stria vascularis has a surface layer made up of a single row of epithelial cells and a deeper layer in which cells are found scattered irregularly among the blood-vessels.

A difference of opinion exists among anatomists regarding the cells found in this deeper layer. One view is that they are epithelial cells derived from the surface layer of epithelium. The other view is that these cells are of mesoblastic origin derived from the connective tissue which separates the stria from the capsule of the cochlea.

HISTORICAL.

Retzius¹ is a prominent exponent of the view that the cells throughout the stria vascularis are epithelial in

¹ "Ueber ein Blutgefäß-führendes Epithel im membranösen Gehörorgan," *Biol. Untersuch.*, ii., 1882.

character. He held that the stria represents a genuine vascular epithelium. This view was shared by Corti, Kölliker, and Waldeyer.

Prenant¹ is the latest advocate of the epithelial character of these cells. He gives the following reasons for accepting their epithelial origin:

"En faveur de la nature épithéliale de la zone réticulée de la strie, nous ferons valoir: le lieu où elle se développe, comparé à celui qu'occupait précédemment le plasmodium épithelial; sa continuité parfaite avec la couche cellulaire propre de la stria vasculaire, et vraisemblablement son épaississement aux dépens de cette couche; ses rapports avec l'épithélium de la prominance spirale et celui de la membrane de Reissner, avec lesquels elle se continue directement au même titre que la couche cellulaire superficielle." (P. 61)

Boettcher² held the view that the blood-vessels of the stria are completely embedded in protoplasmic process from the surface layer of epithelium, whereas the cells found in the deeper layer of the stria vascularis are of connective-tissue origin.

"Während dieses geschieht, geht in den Epithelien eine auffallende Verwandlung vor sich. Sie wenden lange Fortsätze in das unter ihnen liegende Schleimgewebe hinein, welche die nun ganz oberflächlich liegenden Blutgefäße umfassen und sich in dem Maschenwerk hinter denselben verlieren. So entsteht die Stria vascularis. Das Schleimgewebe verfällt allmälig einer völligen Resorption; ist diese beendigt, dann liegt der Gefäßstreifen dem faserigen mehr nach aussen gelegenen Theil des Ligamentum spirale auf." (P. 145)

Schwalbe³ recognized in the cells lying in the deeper layer of the stria vascularis characteristics belonging to epithelium, but, on account of the difficulty in demonstrating the epithelial origin of these cells, was inclined

¹ "Recherches sur la paroi externe du limacon des mammifères et spécialement sur la strie vasculaire," *Internationale Monatsschrift für Anatomie und Physiologie*, Bd. ix., 1892.

² Ueber Entwicklung und Bau des Gehörlabyrinths, Dresden, 1869.

³ Anatomie der Sinnesorgane, 1887.

to accept the view that they were derived from connective tissue.

"Von Zellen lassen sich mindestens zwei Schichten unterscheiden, von denen die oberflächlichen eine nach dem Lumen des Schneckenkanals zu scharf abgegrenzte geschlossene Schicht echter Epithelzellen von polygonalen Umrissen formirt. An Dickenschnitten erkennt man, dass ihre dem Schneckenkanal zugekehrte Fläche durch eine scharfe an einen Cuticularsaum erinnernden feinen Streifen begrenzt wird, während an der entgegengesetzten Fläche zäckige Vorsprünge und nischenartige Einsenkungen der Epithelzellen auf ihre innige Accommodation an die erwähnten Blutgefäß-Capillarnetze zurückzuführen sind. Diese Schicht ist wohl zweifellos aus dem einfachen Epithel der Embryonen abzuleiten. Unter ihr liegen aber in einer oder in mehreren Lagen zwischen den Capillaren noch andere Zellen, welche mehr oder weniger dicht an einander gefügt die Zwischenräume zwischen den Capillaren erfüllen. Sie gleichen an Macerationspräparaten ebenfalls epithelialen Zellen, sind polyedrisch, bei Isolation mit feinen Spitzen und Stacheln besetzt, die wahrscheinlich Intercellularbrücken darstellen. Auch diese epithelioiden Zellen werden von Retzius und Anderen als echte Epithelzellen betrachtet und dann hat in der That die Auffassung, die *Stria vascularis* sei gefäßhaltiges Epithel, ihre volle Berechtigung. Es bleibt dabei aber die Schwierigkeit der Ableitung dieser tieferen 'epithelialen' Zellen von dem einfachen Epithel des embryonalen Schneckenkanals. Mir wurde deshalb mit Gottstein die Auffassung derselben also eigenthümlich modifirte Bindegewebszellen als die natürlichere erscheinen, wenn nicht die scharfe Abgrenzung dieser Schicht gegen das unterliegende Bindegewebe und der continuirliche Uebergang des gefäßhaltigen Epithelstreifens in das benachbarte gewöhnliche Epithel sehr zu Gunsten der Retzius'schen Auffassung sprächen." (P. 352-3)

Gottstein¹ studied the developement of the *stria vascularis* and came to the conclusion that a single layer of cubical epithelium covers the surface of the *stria* and that the cells found in the deeper layer are peculiarly modified connective-tissue cells.

¹ *Archiv für mikroskopische Anatomie*, Bd. vii., 1872.

"Der Raum zwischen der crista ligamenti spiralis und dem angulus vestibularis wird ausgefüllt von der Stria vascularis. Dieselbe wird dadurch gebildet, dass unter dem Epithel dieser Stelle das Bindegewebe eine Strecke weit fast ganz schwindet und statt dessen zahlreiche Capillaren auftreten, die bis an das Epithel herangehen, ein Vorgang, den wir zwar bereits im sulcus ligamenti spiralis gesehen haben, der aber hier nur vereinzelt, in der Stria vascularis in der ausgebildetsten Weise zur Erscheinung kommt. Das Epithel ist unverändert, cubisch und geht am angulus vestibularis in das Epithel der membrana vestibularis über. Die Gefäße der Stria vascularis hängen zusammen mit den Gefässen des stratum semilunare." (P. 170)

Baginski¹ also studied the development of the stria vascularis and was a strong advocate of the connective-tissue origin of the deeper cells. He begins with the stage in the embryo when a single layer of cells is found along the outer wall of the ductus cochlearis and describes the development of the stria vascularis as follows:

"Die Zellen, welche vorher deutlich von einander abgegrenzt (Fig. 1 c) einen schönen grossen Kern mit Kernkörperchen und reichlichem Protoplasma zeigten, lassen bald nur mit Mühe ihre Umrandung deutlich erkennen; die Zellen werden kleiner und die Zellgrenzen undeutlich; das Protoplasma wird körniger und die Zellen nehmen im Allgemeinen eine mit Safranin viel intensivere Tinction an. Zugleich fängt auch die bisher soharfe Abgrenzung gegen das sie von aussen deckende Bindegewebe sich zu verwischen an. Die bisher scharfe Umrandung bekommt einen unbestimmten welligen Charakter; die Grenze wenn auch etwas undeutlich, lässt sich indess immerhin noch erkennen. Die in Frage stehende Bindegewebsslage, welche dem Ductus cochlearis innig anliegt, zeigt in so fern eine Umwandlung, als eine Auflockerung derselben jetzt nachweisbar ist (Fig. 11 a, Taf. vi.). Es rücken die Bindegewebskörperchen mehr aus einander und die Zwischensubstanz erscheint reichlicher und die ganze Lage erheblich verbreitert; hier und da zeigen sich noch Karyokinesen und zahlreiche Blutge-

¹Archiv für mikroskopische Anatomie, Bd. xxviii., 1886.

fässer, welch bis dicht an das Epithel heranreichen. Durch den eben beschriebenen Vorgang wird die Bildung der Stria vascularis eingeleitet und man kann mit Sicherheit bis jetzt nachweisen, dass die Gefässer nicht dem Epithel, sondern dem Bindegewebe angehören, ebenso, dass sie bis an die Epithelgrenzen heranreichen, aber nicht im Epithel liegen."

Baginski describes the condition found in the adult stria as follows:

"Die Gefässer liegen jetzt den so veränderten Epithelien dicht an und betrachtet man die jetzige Form der Stria vascularis, so würde man ohne Kenntniss des Entwicklungsganges in der That zu der Meinung verleitet, das es sich um ein gefäßhaltiges Epithel handelt, während doch entwicklungsgeschichtlich mit Sicherheit die bindegewebige Abkunft derselben sich ergiebt." (P. 22, 23)

Katz¹ has studied the stria vascularis and found a single layer of large cylindrical epithelial cells on the surface which cover over the blood-vessels while the few cellular elements beneath the epithelium he believed to be of connective origin.

"Die unter dem Epithelien liegenden Zellen halte ich nicht für epitheloide oder wirkliche Epithelzellen, wie sie von einzelnen Autoren angesehen werden, sondern für Bindegewebszellen, resp. auch Lymphzellen. Wenn auch die Gefässer direct von den Epithelien bedeckt sind und zwischen ihnen verlaufen, so kann man doch von der Stria vascularis als Ganzes betrachtet, nicht behaupten, dass sie ein reines gefäßführendes Epithel darstelle, denn der untere Theil der Stria enthält sicherlich noch etwas eticuläres Bindegewebe, was beim älteren Embryo und auch beim Neugeborenenen in einem breiteren Lymphnetzstreifen bekanntlich vorhanden ist." (P. 70)

Leimgruber² studied the development of the stria vascularis in the embryo of the guinea-pig and found but a single surface layer of epithelium. He failed to find the processes from this epithelium which embrace the blood-

¹ *Archiv für Ohrenheilkunde Bd.*, xxxi, 1891.

² *Zeitschrift für Ohrenheilkunde Bd.*, xlii, 1902.

vessels as described by Boettcher, Gottstein, Baginski, Katz, and Prenant. The blood-vessels lay in contact with the surface layer of the epithelium. The cells lying beneath this layer and among the blood-vessels he believed were of connective tissue origin.

"Von der ersten Anlage des Canalis cochlearis an bis hinauf zum vollentwickelten Organe besitzt die Aussenwand ein einschichtiges Epithel, das an seiner Basis allerdings mit Blutgefässen in Contact treten kann, niemals aber solche in sich aufnimmt. Auch dieses Verhältnisse in der Stria vascularis bilden also eine Bestätigung der alten Ansicht, dass das Epithel stets und überall gefässlos sei. Die Stria vascularis ist keine rein epitheliale Bildung, sondern man hat an ihr zwei Gewebsarten scharf zu trennen, nämlich eine oberflächliche einfache Epithellage, und zwei tiefere, durch Bindegewebe formirte Scuichten." (P. 61).

From this survey of the literature on the subject the following facts were deduced: First, the free surface of the stria vascularis is covered by a single layer of epithelium with protoplasmic processes which penetrate the deeper strata and envelop, in part at least, the blood-vessels. Second, beneath this surface layer of epithelium and lying among the blood-vessels are other cells which in the adult possess much the character of epithelium, but when studied in the embryo possess characters which suggest a mesoblastic origin.

AUTHOR'S INVESTIGATION.

I began my work on the stria vascularis by making a study of the development of this structure in the embryo of the pig. I made use of embryos of the following lengths, $3\frac{1}{2}cm$, $6cm$, $8cm$, $12cm$, $15cm$, $18cm$, $25cm$. In this work the following three stages in the development of this structure were clearly shown. First, where a single layer of epithelium with a distinct basement membrane is found covering the outer wall of the ductus cochlearis. Second, where a loosely arranged

reticular net-work of cells has formed beneath a surface layer of somewhat flattened cuboidal epithelial cells. All evidence of the basement membrane which was conspicuous in the first stage has disappeared. Third, where the stria appears more compact and narrower than in the second stage. It is evident that the cells found in the deeper layer of the stria in this third stage represent the cells forming the reticulum of the second stage.

Nowhere in this study was I able to find any positive evidence bearing on the problem of the origin of the cells found in the deeper layer of the stria. No facts were found that could be accepted as proof of the view that the cells forming the reticulum of the second stage are of connective tissue origin. I therefore undertook to work out a demonstration of the origin of these cells based on a study of the basement membrane which in the first stage we found separating the single row of epithelium covering the outer wall of the ductus cochlearis from the underlying connective tissue. This membrane we had observed had disappeared when the development of the reticular layer of the second stage was completed. It occurred to me that a careful study of this basement membrane might show that it was still present when the formation of the reticulum of the second stage had already begun. In this case the relation of the membrane to these cells would afford a positive proof of the origin of the cells forming this reticulum and hence of the cells found in the deeper layer of the adult stria vascularis.

METHODS AND MATERIAL.

To work out the demonstration suggested above required the solution of two problems; first, the selection of a stain which would clearly differentiate the basement membrane from the surrounding tissue, and second, the selection of such embryonic material as would show the steps in the development of the stria during the transition

from the first to the second stage, that is, the earliest steps in the formation of the reticular layer.

The selection of a suitable stain was a most important problem, for while both the eosin-hæmatoxylin and the Van Giesen stains would show the well developed basement membrane found in the first stage, neither of these stains were found capable of differentiating the attenuated basement membrane which was present when the development of the reticular layer began. The stain that was found particularly suitable for the demonstration desired was the reticulum stain of Mallory.¹ This stain when carefully applied was found capable of selecting out the finest thread of basement membrane which it stained a bright blue in the midst of cellular elements taking largely a reddish stain.

I had already ascertained that the largest embryo of the pig that still showed clearly the condition found in the first stage, a single row of epithelium with a basement membrane, was the embryo measuring 8cm. The embryo measuring 12cm showed in the basal coil a well developed reticular layer and an absence of the basement membrane. It was clear, therefore, that to find in the basal coil the first steps in the formation of the reticular layer search must be made in embryos measuring somewhere between 8cm and 12cm in length.

The material was secured fresh and placed for 24 hours in Zenker's solution. The embedding was done either in parafin or celloidin. When the latter was used eight different strengths of solution were employed which made it possible to cut sections 5 micra thick.

Considerable difficulty was encountered in finding preparations that would show the first step in the formation of the reticulum of the second stage. The reasons were, that the development of the reticular layer of the stria vascularis is a process which proceeds with great rapidity when once it has begun, and in the second place

¹ Mallory and Wright—*Pathological Technique*.

the measurement of the length of the embryo, however carefully done, was not found to be an accurate enough gauge to determine beforehand the exact stage in the development of the stria. Evidence was soon found, however, to show that the development of the reticulum was often well advanced before the basement membrane had completely disappeared, and with patience I was finally able to get preparations that demonstrated the truth of this fact even more clearly than I had hoped when the work was begun.

Before taking up the description of the steps in the development of the reticular layer the following facts in the development of the stria vascularis should be mentioned. The stria like the other parts of the membranous cochlea develops first in the beginning of the basal coil, the development progressing toward the apex of the cochlea. In the formation of the reticulum of the stria at any point in the cochlea that part develops first which lies nearest the attachment of the membrane of Reissner, while the part nearest the prominentia spiralis is the last to develop. It was frequently found that the development of the reticulum of the stria would be so far advanced near the attachment of the membrane of Reissner that all evidence of the basement membrane had already disappeared when the part of the stria lying nearest the prominentia spiralis still presented a structure made up of a single row of cells with a strong basement membrane.

The description of the following stages in the development of the stria vascularis will suffice to illustrate the changes that lead to the formation of the reticular layer and to demonstrate the origin of the cells found in the deeper layer of this structure. The descriptions and drawings are all made from the stria vascularis of the basal coil.

8 CM. EMBRYO. FIG. I.

At this age a single row of tall epithelial cells along the

outer wall of the ductus cochlearis marks the site where the stria vascularis is forming. The scala vestibuli has not yet formed, but the upper limit of the stria is clearly shown by an abrupt transition in the character of the epithelium from tall cells of the developing stria to low cuboidal cells of the future membrane of Reissner. At the lower limit of the stria the boundary is also clearly shown by a distinct notch covered by epithelium somewhat lower in character which marks the site where the prominentia spiralis is later formed. A strong, well-developed basement membrane separates the layer of epithelial cells along the outer wall of the ductus cochlearis from the underlying connective tissue. This connective-tissue layer which later enters into the formation of the ligamentum spirale is supplied with blood-vessels, which, however, do not approach the basement membrane separating this connective-tissue layer from the surface of epithelium.

10½ CM. EMBRYO. FIGS. 2 AND 3.

The stria vascularis in the basal coil of an embryo pig at this age is in the stage of transition from the first stage as described above to the second stage where the reticular layer is fully developed. The scala vestibuli in the basal coil has already partly formed, and the membrane of Reissner forms a right angle with the outer wall of the ductus cochlearis. The notch which in the 8cm embryo marked the site of the prominentia spiralis has disappeared and this point is recognized by a lower type of epithelium than the tall cylindrical cells of Claudius which clothe the adjoining sulcus externus.

The stria vascularis itself, particularly in the part nearest the attachment of the membrane of Reissner, shows a marked change from that found in the first stage. A single row of more or less flattened epithelial cells forms the surface layer, the protoplasm of which stains

rather deeply, and here and there forms processes which extend into and in places through a deeper layer. This deeper layer is made up of irregularly scattered cells and constitutes the first evidence of the reticular layer of the stria. *A clearly defined basement membrane separates this reticular layer from the underlying connective tissue.* The membrane is directly continuous with a basement membrane separating the epithelial layer of the membrane of Reissner from a loose reticulum of connective tissue still present in the floor of the scala vestibuli. The basement membrane of the stria vascularis is directly continuous below with the basement membrane separating the cells of Cladius in the sulcus externus from the connective tissue of the ligamentum spirale.

An examination of the stria vascularis near the beginning of the basal coil shows a still further development in this structure. (See Fig. 3.) In the first place the basement membrane, which was conspicuously present in the stage described above as shown in Fig. 2, is intact only in the lower half of the stria, whereas in the upper half it has already largely disappeared. Scattered fragments recognized by their blue stain still clearly mark the site of this membrane. In the second place a marked change in the underlying connective tissue has taken place. About midway between the basement membrane and the endochondrial layer a zone of condensation of the connective-tissue cells has formed. On either side of this zone a looser arrangement of the cells is found. On the side towards the endochondrium a loosely constructed fibrillar network of cells exists. On the side towards the stria the network assumes quite a different character. Here the meshes instead of the fibrillar structure have a lamellar character resembling more and more, as the basement membrane is approached, the type of reticulum formed by the cells lying between the basement membrane and the surface layer of epithelium. This resemblance is also evident in its staining properties. Instead

of the bluish stain taken by the fibrillar net-work of the compact zone and the cells lying between this and the endochondrium, this reticulum takes a reddish stain like the reticulum lying between the basement membrane and the surface epithelium. At the several points where the basement membrane is wanting an intimate connection between the reticulum on either side of this membrane exists. So close is this connection that but for the blue stain taken by the fragments of basement membrane it would be impossible to tell where the reticulum formed from the cells derived from the epithelium leaves off and where that formed from the connective tissue begins. In the surface layer of epithelium the protoplasmic processes extending into the deeper layer are more marked. Small blood-vessels containing but a single row of blood cells are occasionally found lying between the basement membrane and the surface layer of epithelium.

15 CM. EMBRYO. FIG. 4.

In the pig embryo of this age the second stage in the development of the stria is found, that is, where the formation of the reticular layer has been completed. The characteristic blood-vessels of the stria vascularis have formed, and these vessels are found lying in contact with the surface layer of epithelium. The compact zone in the underlying connective tissue described in the preceding stage is more clearly marked as is the fibrillar character of the loose network of cells lying between this zone and the endochondrial layer. The reticular layer of the stria vascularis is found to include all the cells lying between this compact zone and the surface layer of epithelium. All vestige of the basement membrane has disappeared, and it is only by comparing this stage with the previous one as shown in Fig. 3, that a correct understanding of the origin of the cells forming the reticulum of the stria is reached. From this comparison

it is perfectly clear that the *reticulum of the stria vascularis is made up of cells derived in part from the surface layer of epithelium and in part from cells derived from the underlying connective tissue*. The line of division between the epithelial elements and the connective tissue elements of the stria is therefore not directly beneath the surface layer of epithelium as claimed by Gottstein, Baginski, and others, nor yet where the reticulum joins the underlying connective tissue as advocated by Retzius, Prenant, and others, but this line of division falls somewhere in the midst of the reticulum of the stria vascularis itself, that is along the line previously occupied by the basement membrane as shown in Fig. 3. The surface layer of epithelium in this stage sends out deeply staining protoplasmic processes which for the most part envelop the blood-vessels.

25 CM. EMBRYO. FIG. 5.

The stria vascularis in this stage has assumed in a large measure the character which it retains permanently. A more or less narrowing of the band is about the only noticeable change that takes place later. In this stage the protoplasmic processes from the surface layer of epithelium, possessing a distinct fibrillar character, have penetrated the entire depth of the stria. These processes taking the stain deeply give to the whole stria vascularis a dense appearance which in the previous stages was noted only along the free surface of this structure. The reticular character of the deeper layer so well shown in the 15cm embryo has been completely obliterated. This has been brought about in part by the invasion of the deeper structures from the protoplasmic processes of the surface epithelium and in part apparently from a partial absorption of the reticulum associated with a contraction which renders the width of the stria considerably narrower than in the previous reticular stage.

That the cells forming the reticulum have not been completely absorbed in this transformation is evident from the cells still found scattered among the blood-vessels and the protoplasmic processes from the surface layer of the epithelium. These are the cells about the origin of which there has been so much discussion in the literature, some observers holding that they are derived from the surface layer of epithelium, others that they are connective tissue cells. Since it has been definitely shown in Figs. 3 and 4 that the cells forming the reticulum of the stria are derived in part from the surface layer of epithelium, and in part from the underlying connective tissue it is fair to assume that these cells found in the deeper layer of the adult stria vascularis are a mixture of epithelial and connective tissue cells.

As regards the question whether the blood-vessels are completely embedded in epithelium, that is whether we have here in the stria vascularis a vascular epithelium, my observations lead me to agree with those who believe that we have in the stria vascularis a genuine vascular epithelium for it is quite clearly shown in Figs. 3 and 4 that the cells surrounding the blood-vessels are derived from the surface layer of epithelium.

RESUMÉ

1. Two views exist regarding the origin of the cells found in the deeper layer of the stria vascularis. One is that these cells are derived from the surface layer of epithelium, the other is that they are of connective-tissue origin.

2. In the development of the stria vascularis three distinct stages are found, *first*, where a single row of epithelium is found along the outer wall of the ductus cochlearis having a distinct basement membrane which separates it from the underlying connective tissue; *second*, where a broad reticular layer has formed beneath

the surface layer of epithelium. In this stage the basement membrane has completely disappeared and the blood-vessels of the reticulum have formed. *Third stage*, the condition found in the adult stria vascularis. Here the stria represents a narrower band than is found in the second stage, protoplasmic processes from the surface layer of epithelium have penetrated the entire stria, the reticulum has been completely obliterated.

3. A study of the transition from the first to the second stage brings out the fact that the basement membrane separating the epithelium from the connective tissue persists until the formation of the reticulum of the second stage is well advanced. The position occupied by this basement membrane is not directly beneath the surface layer of epithelium as it would be in case the reticulum was derived from the underlying connective tissue. The basement membrane is found passing through the midst of the cells forming the reticular layer and at a considerable distance from the surface layer of epithelium. This position of the membrane proves definitely that the cells forming the reticulum are derived in part from the surface layer of epithelium and in part from the underlying connective tissue.

4. The blood-vessels of the stria are placed directly beneath the surface layer of epithelium and as soon as formed are enveloped in protoplasmic processes from the surface layer. In addition the cells immediately around the blood-vessels are clearly derived from the surface layer of epithelium, so that while the cells found in the deeper layer of the stria are in part epithelial and in part connective tissue we are justified in assuming that the stria vascularis represents a true vascular epithelium.

EXPLANATION OF PLATES.

Terms Common to all the figures.

- (a) Epithelium of stria vascularis.
- (b) Connective-tissue layer.

- (c) Endochondrial layer.
- (d) Cartilaginous capsule of cochlea.
- (e) Membrane of Reissner.
- (f) Prominentia spiralis.
- (g) Sulcus spiralis externus.
- (sv) Stria vascularis.

Material fixed in Zenker's solution and embedded in celloidin. Sections for figures 1, 2, 3, 4, cut 5 micra thick and stained with the Mallory reticulum stain. Section for Fig. 5 is cut 10 micra thick, and stained by the Van Gieson method.

FIG. 1.

Sections through outer wall of ductus cochlearis in basal coil of 8cm embryo pig, showing a single row of epithelium with basement membrane. Leitz Obj. 1/7 Oc. 2.

FIG. 2.

Section through outer wall of ductus cochlearis in basal coil of 10 $\frac{1}{2}$ cm embryo pig, showing basement membrane still intact, but separated from the surface epithelium by reticular cells. Leitz Obj. 1/7. Oc. 2.

FIG. 3.

Sections same as Fig. 2, but taken from near beginning of basal coil, showing basement membrane partly absorbed. The outline of the reticular layer shown to include a layer of cells on each side of basement membrane, thus demonstrating that the reticular is made up in part from epithelium and in part from connective tissue. Leitz Obj. 1/12 Immers. Oc. 2.

FIG. 4.

Section through outer wall of ductus cochlearis in basal coil of 15cm embryo pig, showing fully developed reticular layer and complete disappearance of basement membrane. Leitz Obj. 1/12 Immers. Oc. 2.

FIG. 5.

Section through outer wall of ductus cochlearis in basal coil of 25cm embryo pig, showing prominentia spiralis and adjacent part of stria vascularis. Leitz Obj. 1/12 Immers. Oc. 2.

THE VALUE OF V. STEIN'S SYMPTOM IN THE DIAGNOSIS OF LABYRINTHINE SUPPURATION.¹

By DR. W. P. EAGLETON, NEWARK.

(With one illustration in the text.)

THAT labyrinthine suppuration frequently complicates otitis media has been demonstrated in recent years. Its varying degrees of frequency, in the experience of different operators, largely depends on two conditions: First, the opinion of the operator whether or not a radical operation is advisable in all cases of chronic suppuration, without other symptoms; and, secondly, on the thoroughness with which all parts are exposed, and minute granulations and fistulæ are searched for. During the month of last October in following Jansen's operations, what I roughly judged to be about 25% of all his tympanic exenterations disclosed fistula leading into the labyrinth, every one of which he very carefully, but fully, exposed, often at the risk of damage to the facial nerve, but frequently without injuring it.

At the Newark Eye and Ear Infirmary in the services of Drs. Kipp, Seidman, Sherman, and myself, out of 17 consecutive cases of tympanic exenteration, for chronic suppuration, 7, or 41%, were found to have fistula leading into the labyrinth, while 3 more which have not as yet been operated on present symptoms warranting such a diagnosis. Of the 7 cases, 2 had disease of the

¹ Read at the meeting of the Section on Otology, N. Y. Acad. Med., March 8, 1907.

cochlea and semicircular canals, the remaining 5 being of the semicircular canals alone.

Although its frequency is now generally recognized, but little progress has been made in the diagnosis of its existence, the condition being usually unsuspected until discovered at the operation. Thus in the seven cases, in five it was unsuspected prior to the operation, while in the sixth it was tentatively diagnosed, and only positively diagnosed in the seventh. This latter diagnosis was made possible by an investigation of the disturbances of the sense of orientation, or sense of position, during co-ordinate movements, to which von Stein called attention in 1904. In two, at least, of the other five cases, it would have been possible to have diagnosed the condition prior to the operation, as they still exhibited such disturbances, notwithstanding that the labyrinth had been exposed and drained, several months previously.

Von Stein's original paper, published in 1896 (*ARCHIVES OF OTOTOLOGY*, vol. xxv., p. 98), dealt with the "disturbances of equilibrium in ear disease not especially suppurative; first, with the eyes closed, in the absence of ataxia or alterations of sensibility; second, with the eyes open; *rapid* movements never attaining their normal correction and promptitude; third, the disturbances only being demonstrable in certain situations and direction; fourth, not being equally divided between the two lower extremities; thus, for example, a patient can stand on one leg but not on the other; fifth, the polymorphia in the disturbances; sixth, the rapid fatigue in motion, especially with closed eyes; and seventh, the smaller angle of inclination in which the patient is able to preserve the upright position on the goniometer."

It would seem that these important observations would have called for a more thorough investigation on the part of otologists, but little notice was paid to them until von Stein in 1904 (*Trans. 7th International Otological Congress at Bordeaux*, p. 297) called attention to the presence of

a peculiar inability of patients suffering from labyrinthine suppuration to execute certain delicate co-ordinative movements. Thus, with the feet placed together, especially when the eyes are closed, such patients cannot repeatedly jump with the degree of assurance of a normal person, but are compelled to catch themselves after one or two jumps, by throwing one foot out. In some cases this is so marked that they are unable so to jump even with the eyes open. This symptom was present in all of the eight cases of labyrinthine suppuration reported by him, in which subsequent operation verified the diagnosis.

He also reports the behavior of these cases when tested on the goniometer, which showed inability to maintain the erect position at a very much more diminished angle of inclination than normally. With the latter instrument I have had no personal experience, although its application must be comparatively simple.

Recently I have applied von Stein's test on all my private, and on many of the Dispensary cases, suffering from chronic otitis, besides many perfectly normal persons, so that I have observed between two and three hundred persons altogether.

From these observations I draw the following conclusions: First, a normal person not suffering from disease of the labyrinth, suppurative or otherwise, jumps with his eyes closed with a degree of assurance, not perhaps on the first attempt, but surely on the second or third. Second, in applying the test, *age* must be considered, as past middle life normal persons while jumping slowly but accurately for a few feet soon tire and so lose the accuracy of the movement, probably from exhaustion. Third, the symptom has a value in chronic non-suppurative aural disease in which the labyrinth has become affected. Fourth, the symptom is *very* valuable in labyrinthine suppurations, especially in chronic suppurations of the semicircular canals, and, in such, may be the *only* symptom of the condition. It was present in at least five of my

cases and probably in all, had it been sought for prior to the operation. Fifth, the symptom is probably more marked in the early involvement of the labyrinth.

From my cases it would appear that as suppuration goes on the patient gradually regains, to a large degree, the ability to perform the co-ordinate movements, at first lost. This was shown by the following case: A young woman with a chronic suppurative otitis with a discharge so slight that she at first denied its existence, suddenly became dizzy and fell in the street in a "fainting spell," as she called it. She continued dizzy and nauseated for several days, during which time, with a greatly increased discharge, a marked facial paralysis of the same side developed. The dizziness and vomiting soon subsided. Within ten days she was apparently well, although totally deaf in this ear, there still remaining a slight facial paralysis. On examination, however, it was found that she was unable to stand on either foot alone, even with her eyes open. She could, however, stand much longer on the foot of the unaffected side than on that of the affected one. This also within a few days greatly improved and now, eight weeks after the attack, she can stand on either foot for several seconds and there is no trace of the facial paralysis. She, however, cannot jump either with her eyes open or closed, without falling toward the affected side.

Sixth: the symptom persists in some cases after the drainage of the labyrinth, but disappears in others. Thus in five cases observed some months after operation it was still present in three, while in the other two it was absent. Both of these latter were young patients, while the other three were all in middle life. Whether, however, it was present in all prior to the operation it is not known, as they had not been previously tested.

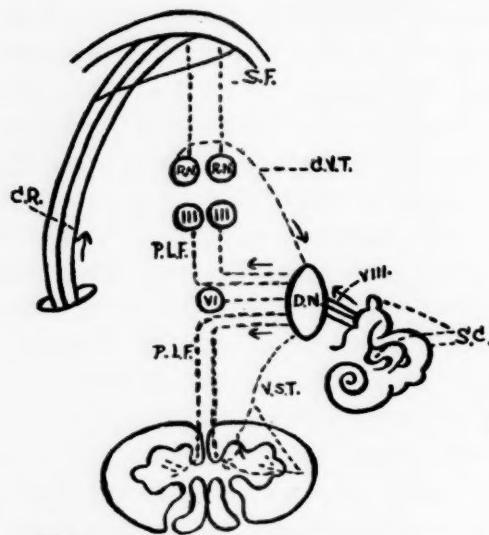
It would appear that the symptoms of suppuration of the labyrinth, where the semicircular canals at least are involved, may be divided into three stages: An active stage,

or stage of irritation, with dizziness, with great impairment of co-ordinate dynamic movements, associated perhaps with nausea, vomiting, and nystagmus; second, a paralytic or latent stage, in which all symptoms are absent excepting the ability to perform with closed eyes certain delicate co-ordinate movements, requiring both a correct orientation and accurate co-ordination; and third, even this may disappear, especially in young persons, after drainage of the labyrinth and perhaps without it.

What physiological data have we for supposing that the vestibular nerve has any influence over the muscular apparatus? "Ewald (Panse, 'Vertigo,' translated by A. Knapp, *ARCH. OTOL.*, 1902, p. 479) assumes the presence of a constant influence on the muscular apparatus of the body through the labyrinth of the same side." "Doves in whom both labyrinths had been removed lost knowledge of the position of the head. If a cap was drawn over the eyes the head sank to the ground from its own weight. The muscular sense thus furnished no clue of the head's position. Dreyfuss (*Id.*, p. 480) also assumes the presence of a labyrinthine tone. He experimented on guinea-pigs and makes a distinction between the symptoms which follow the removal of a labyrinth on the first day and *permanent* ones, the latter consisting of a concavity of the trunk towards the affected side." "Adler (*Id.*, p. 486) assumes the existence of an apparatus of equilibrium whose centripetal arm is the vestibular nerve, whose centre is furnished by Deiter's nucleus, and whose centrifugal arm is the connection of Deiter's nucleus with the oculo-motor nuclei and the anterior horns of the cord. This usually acts below the threshold of consciousness."

Panse (p. 486) says, "we must assume, as my experiments have shown, the presence of numerous connections between the labyrinth and all muscles."

Preserving our equilibrium as we do, first by the exercise of our ocular sense, second our kinæsthetic sense, made-up



*Scheme of connection of
Deiter's nucleus
Copied from Since*

of muscular, cutaneous, articular, and visceral sense, and third by the sense of special orientation situated in the semi-circular canal, observations show that, with an impairment of the sense of orientation in one labyrinth, delicate infrequently used muscular movements cannot be performed with normal accuracy, especially when the ocular sense is also removed by closing the eyes.

- I. ON THE SIGNIFICANCE OF THE OPERATIVE FINDINGS FOR THE DIAGNOSIS OF PURULENT INFLAMMATION OF THE LABYRINTH DURING EXPOSURE OF THE MIDDLE-EAR CAVITIES.
- II. INDICATIONS FOR OPENING A PURULENTLY AFFECTED LABYRINTH.

By PROFESSOR V. HINSBERG, BRESLAU.

Translated by DR. ARNOLD KNAPP, from *Zeitschr. f. Ohrenhlk.*, Vol. LII, Nos. 1 and 2, 1906.

I.

IN order to make a definite diagnosis of a suppuration of the labyrinth it is necessary, in addition to an exact functional examination before the operation, to carefully examine the labyrinthine wall after exposure of the middle ear.

The parts to which we must chiefly turn our attention are well known to be the two windows, the promontory and the horizontal semicircular canal, much less frequently the other semicircular canals.

As the result of this examination is just as important as the functional examination to tell us what further steps we have to take, I should like to briefly review the question as follows:

1. To what degree can we ascertain the presence or absence of these changes with certainty?

2. What deductions can we draw as to the extent of the disease within the labyrinth from the changes which appear externally?

As regards the first question, one of the sites of entrance for a suppuration is the round window. This is inaccessible to a direct examination by the eye and probe as long as the destruction is limited to the region of this window and does not extend to its bony surroundings. A perforation through the round window we would, therefore, never be able to confirm at operation, unless possibly a functional examination might permit this diagnosis.

Fistulæ in the promontorium are, however, directly visible by the eye after the middle ear cavities are fully exposed. Essential for this as well as for the recognition of any change in the labyrinth wall is very careful hemostasis and intense illumination.

Before the operation these fistulæ may sometimes be visible with the otoscope.

Careful use of the probe, which procedure can be undertaken with safety, usually tells us to what extent the destruction extends into the interior of the labyrinth and whether sequestra are situated in the depth. As sequestra are frequently discovered during the after-treatment which presumably were present at operation, it is urged that we examine this area very carefully during operation.

The conditions regarding the oval window are more difficult. From fear of injury to the stapes, we, in conjunction presumably with most colleagues, have carefully avoided this region and have left small granulations situated in the neighborhood of the window. In recent years at every radical operation, if the functional examination has suggested the presence of a labyrinthine suppuration, we have always endeavored to obtain a clear picture of its condition. Numerous cases of meningitis have shown how unfortunate it is to overlook a perforation in the oval window.

A good survey of this window area necessitates a careful diminution of the facial ridge.

Granulations if present are not removed by a curette but by means of a fine anatomical forceps. The stapes has thereby never been injured. We then frequently with our bare eyes have been able to determine whether the stapes was present or not. Then with a probe, if the presence of the stapes is not determined, we endeavor by careful use of this instrument to see whether the window is open or if a firm resistance is present. In a number of cases we have thus been able to determine with certainty a perforation through the oval window. In other cases bony resistance could be felt, so that we had to assume that the stapes plate was still *in situ*. Kuemmel has also frequently been able to recognize the absence of the stapes. In some patients—and these were the majority—it was not possible to obtain any accurate information.

In these examinations a dislocation of the stapes has never occurred, a condition which would have surely been revealed by the consequences. This subject is not, however, exhausted, and with increasing practice in observation I think the number of indefinite cases will decrease. In one case paresis of the facial nerve, which had been exposed by a cholesteatoma, resulted after the use of the probe.

In brief, I maintain that complete absence of the stapes may frequently be determined at operation.

On the other hand, it will probably not be possible to define a defect in the annular band or in the footplate if the rest of the stapes is still preserved.

A perforation in the region of the horizontal semicircular canal may be easy or difficult to recognize. It is easy when, as in the form which Jansen has so well described, the semicircular canal, in its gross appearance unchanged, presents a distinct furrow along the prominence.

Unquestionably spontaneous dehiscences may occur in this prominent part of the semicircular canal, as Brieger has correctly pointed out. Their association, however, with a purulent otitis is surely very unusual.

This variety of fistula of the semicircular canal is the most frequent. The correct interpretation of the picture is more difficult when by erosion, especially by cholesteatoma, the prominence of the semicircular canal is destroyed. Then, even for the experienced one, it is difficult to decide whether a small depression is the lumen of an exposed canal or a small cell of an accidental depression. Osteophytes may complicate the picture to a greater extent.

When the fistula is situated at an atypic situation, namely very far forward or very posteriorly, its recognition is not easy. Recently at an operation we found an oval depression very far posteriorly which appeared to be somewhat darker. As facial paralysis had been present before the operation, we could not decide whether this was an erosion of the semicircular canal or of the facial canal. Examination with the probe seemed to be impracticable. The question was solved upon surveying the oval window and finding the stapes to be absent. A probe introduced through the window entered freely into the fistula and at this moment discharge issued from the fistula. Similarly, on probing the oval window we discovered a very fine opening at the upper part of the prominent ridge which before had escaped our attention. As the surface of the semicircular ridge was otherwise intact, we assumed that a perforation had taken place from within outward.

According to Jansen and Friedrich, the presence of a dark line at the level of the semicircular ridge, meaning a translucent lumen, is generally the evidence of extensive disease of the interior of the labyrinth.

Brieger, on the other hand, thinks that a healthy

lumen of the semicircular canal may appear dark when the bony capsule is very thin.

In certain cases a decision can be reached on carefully inspecting the oval window and the promontorium. If a perforation is present the dark line is probably pathological.

In our experience the cases with disease of the semicircular canal have been easily recognized.

Very much more difficult are the conditions in the presence of fistulæ in the posterior or upper canals. These result generally from deep-seated destruction of the petrous pyramid, and it probably is very difficult to recognize the lumen of a canal in a diseased area unless the diseased focus extends into the fistula, and then the condition is cleared up on the use of a probe.

The importance of a careful examination cannot be overestimated in the determination of the extent of the suppuration within the labyrinth.

We are aided also by the many histological examinations of diseased labyrinths which have been published during the last years.

They show without exception that in the presence of a perforation through the window or in the promontory, an extensive destruction is present, and this is all the more confirmed when the functional examination before the operation reveals, in addition to deafness, distinct disturbances of equilibrium, whether they are of an irritative or of a paralytic character.

There can be no discrepancy in the opinions on this condition.

The importance of fistulæ in the semicircular canal is, however, not accepted by all.

These are unquestionably in certain cases signs of extensive labyrinth infection, especially when, as is not infrequent, there are also other labyrinthine fistulæ and the functional examination has shown distinct disturbances.

On the other hand, there are unquestionably cases of semicircular fistulæ where the infection has remained localized to the immediate neighborhood and we have circumscribed labyrinth disease before us.

This variety was first described by Jansen. Recently Friedrich in his monograph has not been able to confirm the condition. I should, therefore, like to report a number of autopsies.

The first is the well-known case of Jansen, in which the author says expressly that the membranous horizontal canal was dark red in color and swollen, and on microscopic examination the wall was found to be infiltrated with small cells, while the upper semicircular canal, the vestibule, and the cochlea were without particular change, even on microscopic examination.

The site of infection, a very small round defect in the anterior branch of the horizontal canal well in the tympanum, was overlooked at the operation.

Friedrich thinks that in this case, as well as in one which I reported, the operative injury was responsible for the changes. I am entirely on Jansen's side and cannot see how there is any room for the thought of a traumatism during operation in this description. On the other hand, granted that the injury to the semicircular canal did take place at operation, that, nevertheless, does not change the fact that the inflammation remained localized to the semicircular canal.

I have published a case of isolated disease of the upper semicircular canal ("On the Formation of an Otitic Cerebellar Abscess: Infection through the Hiatus Subarcuatus." *Deutsche med. Wochenschr.*, 1904, No. 39). In this case the bony wall of the upper semicircular canal was destroyed by an extradural abscess, so that its lumen was widely opened. The membranous canal was also defective. In the immediate neighborhood of this area there was a similar small infiltration. The labyrinth otherwise was free from pathological changes.

Zeroni, in vol. Ixiii. of the *Archiv f. Ohrenheilk.*, has reported a case of isolated disease of the semicircular canals. Absolute proof of this supposition could not be furnished, as the preservation of the specimen was faulty. The author has personally informed me that he himself did not question the fact that the suppuration remained localized to the semicircular canal.

A certain case of isolated disease of the semicircular canal is given in the Yearly Report of the Halle Ear Clinic for 1904-05. In the autopsy report it is stated that a fistula in the horizontal semicircular canal is closed towards the membranous labyrinth. The labyrinth fluid is clear. In Case 11 it is also stated that there is a fistula in the semicircular canal—labyrinth water clear.

Moreover von Stein states that in five of his cases disease was found limited to the perilymphatic space in the region of the semicircular canal fistula.

Goerke found a fistula in the ampullary prominence which was separated by connective tissue from the rest of the labyrinth.

In addition to these autopsy reports, it has frequently been possible in the living to determine that a large part of the labyrinth was capable of its function, notwithstanding the presence of a fistula in the semicircular canal.

It is not infrequent to find a fistula in a semicircular canal and a cochlea which possesses its function.

A striking case of this is that of Mrs. W., who before operation was able to hear a whisper at 2m. As at that time I could not reconcile such good hearing with labyrinth disease, I assumed the severe disturbance of equilibrium associated with vertigo to be due to a cerebellar abscess, which we, however, did not find. Then I decided to sacrifice the well-preserved drum and exposed the labyrinth wall, to find a fistula in the semicircular canal. The labyrinth was not opened on account of the excellent hearing. The patient recovered. Destruction of the

ossicular chain reduced the hearing. Two years later the hearing was re-examined and found to be, whisper in 20cm.

Of interest in this connection is a case reported by Jordan and A. Knapp (*ARCHIVES OF OTOLGY*, vol. xxxii,) where at operation fistulæ were found in the semicircular canals on both sides; while one ear was deaf after operation, the hearing in the other was $\frac{1}{2}$ %, which was improved to $\frac{2}{3}$ by the use of an artificial drum.

In most of the cases of fistulæ in the semicircular canal there were distinct signs of irritation or defect in the vestibular system. These, however, may be entirely absent. This condition has only been ascertained since the time that we examine each patient before operation on the ear according to von Stein's method.

In the recent case of a young man, where the functional examination (hearing and equilibrium) did not give the slightest clue to disease of the labyrinth, a typical fistula was found at operation in the semicircular canal, which admitted a probe. After this there was distinct disturbance of equilibrium which persisted for a few days. Some time after the operation deafness was distinctly present.

This can possibly be explained by the fact that, notwithstanding a defect in the bony canal from the cholesteatoma, extensive disease of the membranous canal had not occurred. This first followed the traumatism produced at operation.

If we take in review these facts, I do not think there can be any question that isolated disease of the semicircular canal occurs. The frequency of this condition in proportion to extensive suppurations is still undecided.

Formerly, when our knowledge of labyrinthine suppurations was limited to conditions found at operations, we thought that they were very frequent, while Friedrich believes that their existence has really not been proven, based on the autopsy reports of patients who died from

labyrinth suppurations. He regards the frequent observations of so-called labyrinthine fistulæ to be found in literature as based on mistakes in observation.

If we were to decide the frequency of isolated suppurations of the semicircular canals by the number of cases which have been histologically examined they surely would be very unusual, because, compared to the few which I have just been able to quote, there are a great number of cases of panlabyrinthitis. I do not think, however, so extensive a deduction can be drawn from this fact.

As extensive disease of the labyrinth is frequently followed by fatal complications, it is found present at autopsy by the otologist. The case of the circumscribed inflammation is, however, quite different. It never leads to death as long as the inflammation remains localized to the semicircular canal. We may expect to find it at the autopsies of those persons only who have died of a disease independent of the labyrinth—and this in fact was true of the few cases above quoted by me.

Further systematic examinations are necessary along this line, and it probably will take a number of years before this question can be decided.

II.

The successful solution of the question when the purulently affected labyrinth was to be opened at operation was prevented by a number of conditions: First it was impossible in every case to diagnosticate a labyrinth suppuration, and, secondly, it was impossible to determine its extent with any degree of probability. Furthermore we were ignorant of the danger of operating in the region of the labyrinth, as well as of the result of operations as shown by the subsequent course of the disease.

To any one conversant with recent literature the

variance of the views of various authors as regards the last point must be apparent. For instance Botey (*Annales des maladies de l'oreille*, Dec., 1903) does not believe the danger of operating to be very great; in every case, even in circumscribed disease of the semicircular canal, the labyrinth should be opened. All others consider every operation on the labyrinth to be very dangerous. Friedrich, in his monograph (p. 104), says there are a certain number of cases where meningitis followed an operation of this character (the broad opening of a semi-circular canal), and Zeroni, in his article on post-operative meningitis (*Archiv f. Ohrenheilk.*, vol. lxvi., p. 234), believes that operations on the labyrinth carry with them a greater danger than those which consist in exenteration of the tympanum, and that the above cited number of cases of meningitis would be very much larger if the fatal cases following operations on the labyrinth had been added to it. As there is danger of producing an infection of the meninges by tearing protective adhesions, it is to-day generally accepted not to operate in cases where labyrinth disease has been definitely known to exist, unless threatening symptoms are present or collections of pus under pressure are recognized. I asked Dr. Zeroni to which cases he was referring in the above quotation, and he replied that he had in mind the case of Hintze published by Jansen, which I had in my first monograph described as a death due to operation, and Case 13 of Friedrich. I cannot, however, agree to accepting the latter case, because the patient was entirely well for eight days after the operation, then signs of a fatal meningitis appeared. I believe it is much more probable that in this case the operation on the labyrinth was not timely enough to prevent extension to the meninges. Zeroni added in his letter that he also had in mind the accidental openings of the labyrinth.

Klug in his article on Suppurations of the Labyrinth (*Annales des mal. de l'oreille*, vol. xxxi., No. 2, 1905)

says: "I wish only to mention the danger of a meningitis due to operation which appears most frequently after trephining the labyrinth" (p. 186). He mentions, however, that among nine of his own cases no meningitis followed, so that the danger cannot surely be very great.

Objections to operations on the labyrinth are based principally on theoretical and presumably perfectly proper reasons, that by the operation the protective adhesions are torn and we induce an infection of the interior of the skull which is just what we are trying to avoid.

In order to test this particular objection, I have had collected all cases of labyrinth operations so far as they were accessible. Dr. Freytag found that his figures spoke with great probability in favor of opening of the labyrinth. It does not necessarily expose the patient to greater danger, and the prognosis is much improved.

I need hardly mention that this question has not been definitely solved by our statistics. On the other hand, these figures are so large and the differences are so striking that the rôle of accident may be excluded, and I think we are safe in following this experience so long as we have nothing better, and are even entitled to outline some indications for the operation.

The operation, to my mind, is always necessary when an exact functional examination (deafness and symptoms of irritation or defect of the vestibular apparatus) and the conditions found on exposing the middle-ear cavities show us that extensive disease of the labyrinth is present.

If the functional examination and the operation point to circumscribed disease of the semicircular canal, or if at operation a labyrinth fistula cannot be definitely proven, I think it is best at first to wait, then to operate secondarily if the symptoms of irritation which were present before the operation do not quickly disappear, or if these should appear first after the operation on the middle ear.

Moreover the suspicion that an endocranial complica-

tion is present or threatens indicates the opening of the diseased labyrinth.

These indications are somewhat more extensive than those of Jansen, because we regard the operation as indicated even in cases without symptoms of irritation but which definitely present symptoms of defect. This has especially been proven to my mind by the fact that it is in just these latent cases that a radical operation, if it does not invade the labyrinth, is frequently followed by meningitis.

Expectant treatment in circumscribed disease of the semicircular canal is recommended, because this form frequently is recovered from, and rarely leads to a fatal complication.

In my own personal experience, of all the cases of circumscribed semicircular disease observed at Breslau, not one succumbed to the consequences of a labyrinth suppuration.

The autopsy reports of cases dying from the results of a labyrinth infection seem also to confirm this view. Among these I discovered a case reported in the Halle Clinic (1898-99) where a semicircular canal proved to be the only site of infection, while in the others destruction was also present in the neighborhood of the windows or in the promontory wall in addition to the semicircular-canal fistula. Death followed in this patient so short a time after the middle-ear operation that it can hardly be assumed that a localized affection of the semicircular canal was present at operation, which in turn produced an infection of the rest of the labyrinth with a secondary formation of fistulæ in the window or promontory.

It is perfectly reasonable to say that during the operation a circumscribed suppuration has been allowed to extend, through careless use of the probe, concussion from the chisel, retention from too firm packing, etc. This seems to have been the case in our Case 47, as before

the operation there was some hearing, which was lost afterwards.

These exacerbations, so far as I can judge, are very unusual in circumscribed disease of the semicircular canals, but very frequent in diffuse suppurations of the labyrinth. It is very important to watch very carefully after the operation a patient who presents an apparently isolated fistula of the semicircular canal at the time of exposing the middle-ear cavities, so that symptoms pointing to an extension in the inner ear shall not be overlooked. These are primarily the symptoms of irritation, vertigo, nystagmus, then diminution of hearing which was preserved before the operation. As soon as we are assured that the encapsulated suppuration has become extensive, the broad exposure of the labyrinth cavities must be undertaken and performed, on account of the danger of a retention of pus in the interior of the labyrinth. This is the rule by which we have been guided for the last year in the Breslau Clinic. We have but rarely been in doubt as to what to do, except when before the operation there were distinct symptoms of defect and at operation a fistula could not be found proven to exist. In these unclear cases we have waited without having occasion to regret it, though I think this point is still unsettled.

The cases with the formation of sequestra in the labyrinth are to be regarded, for indications to operate, as diffuse labyrinth suppurations.

If the sequestrum is movable at the time of operation on the middle ear, its immediate extraction is recommended, after enlarging the fistula between the middle ear and the labyrinth if necessary. Numerous cases have shown that the very severe symptoms of irritation disappear and the wound first begins to heal when the sequestrum has been removed. Moreover the patient is constantly in danger of the onset of a meningitis. The conditions, however, are quite different if the se-

questrum is not freely movable. In this case it is generally recommended to wait, and von Stein favors this advice because he fears forced loosening of the fragment would cause injury to the carotid. This accident has occurred to him in many cases. It is, however, not to be forgotten that a threatening meningitis is always to be feared, a condition which makes the decision in these cases not an easy one.

Whether it is best to open the labyrinth immediately in accidental operative dislocations of the stapes, cannot be decided at the present time.

As far as I know these attempts have not been made, presumably because the injury has not been recognized during the operation but only by its consequences. If these appear as labyrinth irritative symptoms, we should immediately decide on operation on the labyrinth, for the previously published fatal cases—to which I regret to have to add another—unquestionably demonstrate the danger which the patient runs without operation.

OCULAR AND ORBITAL SYMPTOMS IN DISEASES OF THE SPHENOIDAL CAVITY.

REPORT OF A CASE WITH AUTOPSY

BY DR. HERMANN SCHROEDER, ERLANGEN.

Translated from *Zeitschrift f. Ohrenheilk.*, Vol. LIII., 1906.

THE monographs treating this subject are the following: Eversbusch, "The Diseases of the Eye and their Relation to Diseases of the Nose, of the Accessory Cavities, and of the Ear." (*Graefe-Saemisch Handbuch der gesamten Augenheilkunde*, vol. ix., Chap. 16, 2d edition, Leipzig, 1903.) This contains a review of the literature for 100 years, from 1803 to 1903. In 1902, Stanculéanu published "The Anatomic and Pathologic Relations between the Sinuses of the Face and the Orbito-Ocular Apparatus" (Paris, Steinheil, 1902). In 1905 and 1906 appeared Moreau's paper on "The Oculo-Orbital Manifestations of Sphenoidal Sinusitis" (Lyon, Schneider, 1905), and Baumgarten's "Acute Inflammations of the Eye Following Acute Affections of the Nose." (*Monatschrift f. Ohrenheilkunde*, 1906, No. 5.)

I shall draw upon these papers for all that concerns the anatomy, pathology, and clinical course of the diseases of the sphenoidal cavity and their relations to the orbit. In general it may be said that the accessory cavities of the nose are directly adjoining to the orbit above, at the inner side, and below. The bony partition is not thick and very frequently there are congenital defects, so that the periosteum or the mucous membrane of an

accessory cavity directly meets the periosteum of the orbit. Moreover the bony wall is perforated by suture lines, blood-vessels, and nerves, which all may furnish opportunities for extension of a pathologic process. There is close relation in the nutrition of these areas through the lymph vessels, the ethmoidal and the ophthalmic arteries; also the fact that the ophthalmic vein receives venous blood from the nose and its accessory cavities. Eversbusch cites personally observed cases showing the intimate relation between the orbit and the nasal cavities and the consecutive frequent coincidence of diseases of the eye and of the nose. He has repeatedly observed that the onset of sympathetic inflammation of the second eyeball was preceded by a marked swelling of the mucous membrane of the nose, which remained regularly localized to the corresponding side of the nose and then extended to the other side. After removal of the primarily diseased eye, among the prodromal signs of an involvement of the other eye was a swollen condition in the nose. Eversbusch even regards the findings in the nose as an indicator to determine the timely enucleation of the diseased eyeball. During the enucleation of the diseased eye this author permits the bleeding to continue, in order to permit the anastomoses of the nose to be freed of their toxic substances. For this same reason he does not suture the conjunctiva and does not apply a pressure bandage.

He has frequently observed exacerbations of sympathetic iridocyclitis to be associated with marked catarrhal symptoms in the nose, or, if these were already present, with an increase of the symptoms, of which the patient generally was himself conscious.

As regards the special anatomy of the sphenoidal cavity, its wall takes part in the formation of the posterior-internal surface of the orbit in 65% of the cases, and, according to the investigations of Bertemès, to an extent varying between 5 and 14mm (Stanculéanu). This

bony partition between the sphenoidal cavity and the orbit is usually very thin ($\frac{1}{2}$ mm). Various investigators have observed small dehiscences (Berger, Holmes, and Gallemann). In these cases the mucous membrane of the sphenoidal cavity is directly adjoining the nerve-sheath of the optic nerve and the ophthalmic artery, so that it is apparent that an inflammation of the cavity can easily invade this structure.

The sphenoidal cavity not only borders on the optic-nerve canal but also on the sphenoidal fissure and comes into relation with the various structures which pass through this fissure to the orbit, to the eyeball, and to the forehead. These are the oculomotor nerve, the trochlear nerve, the first branch of the trigeminus, the abducent nerve, and the ophthalmic veins. Farther backward in the direction of the interior of the skull the cavernous sinus lies next to the upper half of the lateral wall of the sphenoidal cavity; and it is especially important to remember that the oculomotor and abducent nerves in their course through the cavernous sinus are contiguous to the wall of the sphenoidal cavity. In the depression of the sphenoidal bone which contains the cavernous sinus, the bony wall of the sphenoidal cavity, especially when this cavity is broad, is exceptionally thin, and Zuckerkandl has drawn attention to the occurrence of dehiscences, though these are not so frequent as in the bone next to the optic-nerve canal.

Congenital defects in the region of the sella turcica have been observed by a number of authors, and Stancu-léanu regards this area as a site of predilection for pathologic perforations. I mention this because in our case a perforation was found in this region. Some other cases of a similar nature will be cited.

The numerous vascular communications between the blood channels at the base of the skull and the bony substance of the sphenoidal body, and with the mucous lining of the sphenoidal cavity were mentioned by

Moreau. These may facilitate extension of a suppuration from the sphenoidal cavity to the blood channels and to the meninges.

Generally the two sphenoidal cavities are separated by a thin but complete bony septum. Defects in the septum have, however, been observed by Hajek and Zuckerkandl.

The two cavities are frequently not of the same size, and the septum may be displaced laterally. This may be so marked that a complication of the orbit of one side may be due to an inflammation of the sphenoidal cavity of the opposite side.

With the increase in size of the sphenoidal cavities the thinness of the wall is proportional, and therefore extension of any suppuration to the important neighboring organs is facilitated.

These unfavorable conditions are present when the processes of the sphenoidal bone are converted into pneumatic cavities.

If this change involves the small wings of the sphenoid, then the optic nerve is completely enclosed by empty cavities and the danger of its involvement is naturally much greater.

This change, if it extends downward and outward, may bring the diseased cavity into direct relation with the round and oval openings, and this abnormal formation may be so pronounced that the sphenoidal cavity and the cavities of the superior maxilla become so nearly approximated to one another that only a thin bony partition intervenes. In these cases the supramaxillary nerve is very apt to be involved; the pain experienced below the eye may simulate disease of the antrum of Highmore even when the sphenoidal cavity alone is involved. On the other side, a healthy sphenoidal cavity may be infected from a diseased antrum and thus lead to a fatal intracranial complication. This may occur when the sphenoidal cavity is of normal size and when

the cavity of the superior maxilla is dilated in the form of a sphenoidal recess (Zarniko).

The soft parts may be involved in the pterygo-palatine sulcus and in the retromaxillary fossa in a suppuration of the sphenoidal cavity, as is readily explained by their anatomic relationship.

Of considerable importance are the size and position of the opening of the sphenoidal cavity. The smaller the opening the more likely is this opening to be occluded by inflammatory swelling of the mucous membrane and thus cause pus to accumulate under pressure within the cavity. The situation of the ostium nearer the roof than the floor is unfavorable. Thus the escape of pus is rendered more difficult and in the dorsal decubitus only occurs when the cavity is entirely filled. These patients usually empty the contents of this cavity in the morning by holding over their heads.

Mention should also be made that a posterior ethmoidal cell protrudes sometimes to a considerable extent into the corresponding sphenoidal cavity; this is important to remember when operating. The distance between the ostium and the external opening of the nose is important for the purposes of probing; numerous measurements have given this as about 7cm.

The discovery of this ostium has been facilitated by the introduction of Killian's speculum; the probe is of course to pass the middle turbinal at its middle.

There are cases, even after the use of cocaine, where the olfactory fissure does not permit a view of the anterior surface of the sphenoidal cavity and of the sphenoidal ostium, and the introduction of a probe is difficult. In these cases, according to Hajek, the middle turbinal must be resected. In my opinion, when the septum is deviated a submucous resection should be undertaken.

As regards the clinical manifestations of an empyema of the sphenoidal cavity, I should like first to mention

that Hyrtl, in 1882, stated that the sphenoidal cavity was utterly beyond manual and instrumental intervention. Though this statement has been in recent years completely refuted, the surgery of this cavity is extremely difficult and the knowledge of its diseases and complications is not thoroughly understood. We should not, however, forget that diseases of the sphenoidal sinus and their complications frequently make but few signs during life and are often not discovered until autopsy. In addition to the condition of the nose, the most regularly found symptoms are the following: dull sensation in the middle of the head, occipital pain, neuralgia, lachrimation, swelling of the lids, immobility of the eyeball, protrusion of the eyeball, thrombosis of the ophthalmic veins, and disturbances of vision.

The symptom of lachrimation has been observed a number of times, though it is questionable whether this symptom is present in isolated disease of the sphenoidal cavity.

More frequent are neuralgias, especially in the distribution of the frontal, supraorbital, and infraorbital nerves. Their relation to the sphenoidal sinus has been described. In the presence of neuralgia of these nerves, when we do not know a definite cause, the nose should always be examined.

The subjective symptoms, as far as they involve the sensory nerves, have been carefully described by Schaeffer, who distinguishes between acute and chronic disease of the sphenoidal cavities. In the former, the patients have complained of excessive pain in the region of the forehead, in the occiput, in the middle of the head, and sometimes in the depth of the skull. In chronic disease, vertigo, supraorbital neuralgia, frontal headache, etc., are present. These vary in severity and the patient may be unable to follow his work.

In one case of Hajek's the pain was localized to the left supraorbital area, though the sphenoidal cavity of

that side alone was involved. In our case the frontal sinuses were healthy, but severe pain in the region of the left frontal sinus was pronounced.

The cerebration of the patients, the ability to concentrate, and the memory were all affected. In some conditions of depression have been caused, even leading to attempts at suicide.

Of ocular symptoms, scintillating scotoma was observed most frequently. In some cases disturbances of accommodation have been observed. The intimate relationship of the oculomotor nerve to the sphenoidal cavity in the cavernous sinus has been described. It is possible that these fibres are the first ones to be involved. When the process extends, the entire oculomotor trunk and the abducent or the trochlear nerves may also be paralyzed. These same symptoms may be produced by an otitic condition. Bircher has reported a case of phlebitis of the transverse, of the inferior petrosal, and cavernous sinuses, where pus had extended to the apex of the petrous pyramid. There were irritation of the trigeminal nerve and oculomotor paralysis. After removal of the pyramid, recovery took place. Isolated paralysis of the abducent nerve of otitic origin has been repeatedly observed. A description of all these cases and of the path of infection has recently been given by Alt (*Monatschr. f. Ohrenhkl.*, 1906, No. 2).

Whether paralysis of all the external ocular muscles is sufficient to explain exophthalmos is difficult to explain. As a rule, this symptom is due to oedema of the orbital tissue or to some retrobulbar process. An inflammatory exophthalmos is generally associated with an oedema of the lids and chemosis. As both of these conditions were absent in our case, I think an exophthalmos can occur from simple muscular paralysis.

The path by which disease of the sphenoidal cavity may lead to a retrobulbar inflammation and then to exophthalmos has been mentioned. The severe conse-

quences of pressure upon the optic nerve and the nutrient blood-vessels are apparent.

As regards etiology, only as much will be touched upon as is necessary to elucidate our case of erysipelas. According to Eversbusch, it is generally impossible to say whether the affection of the nasal accessory cavities or the erysipelas was the primary condition. Weichselbaum has shown that erysipelas of the face may be the primary focus of infection. On the other hand, a number of cases have been reported by Hajek in which the nasal empyema had preceded this affection. This author has also observed cessation of attacks of erysipelas after the healing of chronic empyema.

According to Moreau, of his 13 cases 2 were due to erysipelas; in our case everything seems to speak for erysipelas as the primary affection.

There is another path of infection to the sphenoidal cavity, namely by way of the palatal tonsils. Moreau has described one of these cases.

A patient suffered from headache and vomiting for 11 days after onset of a purulent tonsillitis. There were œdema of the eyelids and left-sided exophthalmos with high fever and rigors. Notwithstanding an incision into the orbit, the patient died.

The autopsy revealed a thrombus of the coronary and cavernous sinus with necrosis of the body of the sphenoid; meningitis and gangrenous areas in the frontal lobe. Pus filled the space between the dura and the sella turcica.

There are two ways by which infection may travel from the tonsils to the sphenoidal cavities: (1) directly along the mucous membrane of the naso-pharynx; (2) by the blood and lymph channels; the lymphatic network of the sphenoidal bone stands in communication with the pharyngeal lymph glands.

Eversbusch has reported 8 autopsies of isolated suppurations of the sphenoidal cavities. In 6 of these the path which the pus followed to gain access to the interior

of the skull was accurately determined: in 4 through the diploë of the upper wall, in 2 by perforation. Moreau has described 13 autopsies where a perforation was found in the upper wall in 3. In one of these cases the perforation had a diameter of 3-4mm, and was situated in the middle line of the anterior half of the sella turcica.

On careful examination it was seen that the septum of the sphenoidal cavities was deflected to the right; the perforation was consequently in the left cavity. This was filled with pus and the mucous membrane was thickened; the right sphenoidal sinus contained clear mucoid fluid.

Another case of perforation is our case.

A few words regarding prognosis and treatment. The prognosis is always serious on account of the proximity of vital organs. A perforation through the upper wall may be followed by meningitis and thrombosis of the cavernous sinus. A necrosis of the lateral wall may cause blindness through pressure on the optic nerve or by perineuritis, exophthalmos, retrobulbar abscess with consecutive meningitis.

Schaeffer has reported the following remarkable terminations:

Gradual separation of isolated parts of the sphenoidal body without causing any disturbance of vision, but finally followed by meningitis;

Sudden discharge of a large part of the sphenoidal body through the nose;

Fatal hemorrhage from perforation through the wall between the cavernous sinus and the sphenoidal cavity;

A retropharyngeal abscess.

Treatment consists in a broad opening with removal of all diseased parts. The endonasal methods have been described.

Recent publications on this subject are those of:

Onodi: "On the Broad Endonasal Exposure of the Sphenoidal Cavity." (*Arch. f. Lar.*, vol. 16, No. 3, p. 454.)

Stoeckel: "Broad Endonasal Opening of the Sphenoidal Cavities with the Burr." (*Arch. f. Lar.*, vol. 17, p. 496.)

Hajek: "The Diagnosis and Intranasal Surgical Treatment of Suppurations of the Sphenoidal Cavity." (*Arch. f. Lar.*, vol. 16, 1, p. 105.)

The after-treatment is described in Schaeffer's monograph.

In 1893 Jansen described a method of operating from the frontal bone. He opens the frontal sinus, resects the floor and the greater part of the orbital process of the frontal bone, and then passes through the ethmoidal cells to the sphenoidal cavity.

In 1897 Jansen suggested another method at the Congress in Moscow, namely, through the maxillary sinus. He has made use of this method in a large number of cases, but only in those cases where the maxillary cavity was diseased. Furet opens the healthy maxillary cavity in order to reach the ethmoidal cells, and exposes the anterior and external wall of the sphenoidal cavity. He regards this method as better than any other.

Whether it is justified to open the healthy Highmore antrum in order to reach the sphenoidal cavity is still a disputed question. Owing to the dangers which a suppuration in the sphenoidal cavity offers, this operation would surely be justified in certain cases, and, if the operation must be done, it is best to select that method which gives us the broadest exposure. Recently Denker has suggested a method which would serve for thorough exploration of the sphenoidal cavities. (*Münch. med. Wochenschr.*, No. 20, 1906.)

This method has the important advantage that no external wound is made, and that after-treatment can be carried on from the nose. Moreover the operation is one-sided and can be carried out without any danger of aspirating blood. Stoeckel complains of severe hemorrhage which results from removing the posterior ethmoidal

cells; consequently after packing for a few days he proceeds with the operation. This method is, of course, not suited when threatening symptoms are present.

Our case is as follows:

M. K., twenty-eight years of age, admitted May 5, 1906.

As a child, had had measles and scarlet fever with some aural complications. Four weeks ago the nose began to swell and become red, with the formation of vesicles (erysipelas?). This was followed by headache which became steadily more severe. Eight days ago the patient complained of vertigo and was unable to stand alone or to walk. There was some pain experienced in the left ear.

Two years ago the patient received a number of injuries about the head which kept him in bed for two weeks.

On Admission.—Moderately well-developed man. Sensory somewhat clouded. Sways on standing, and cannot walk long but falls to the left side. Turning his head is not painful. On bending the head forward there is distinct pain and rigidity of the neck. Herpes of the lips. Pulse, 72; temperature, 38.6° C. The abdominal reflexes are somewhat exaggerated. Kernig's sign absent. Urine normal.

Eyes: Marked exophthalmos left. Movements restricted, especially outward. Marked horizontal nystagmus.

Ears: right, *Mt* clouded; left, the inner part of the canal wall is very red. The soft parts about the apex of the mastoid are infiltrated, continuous with a swelling in the neck. The lower part of the mastoid process and the soft part surrounding are tender.

Functional examination: right, voice 2cm; left, whisper 8cm. Lower tone limit, right and left, D². A lateralized to the right ear, — 45'. Rinne, on both sides, + 12'. Galton, right, 0.7; left, 1.5.

There are no abnormalities to be seen in the nose.

May 5th.—Lumbar puncture performed; a somewhat clouded cerebrospinal fluid evacuated. This fluid contained diplococci which were regarded as meningococci. On culture, yellow staphylococci developed.

May 6th.—Marked nystagmus. On looking up, the left eye does not follow. There is moderate exophthalmos.

Pupils are medium; react to light. Left, the eye-grounds are both normal.

Operation.—The mastoid process and the posterior cranial fossa were exposed. The mastoid process and the antrum proved to be normal. Through the exposed cerebellar dura a number of perforations were made in various directions without result.

May 7th.—Pulse 60; temperature, 37.4° - 38.6° C. Left-sided facial paralysis. The movements more restricted, especially outward. Left ptosis. Right, beginning paralysis of the abducent. No hemianopsia; no nystagmus and no Kernig. The trigeminal area normal. Moderate tenderness over the floor of the left frontal sinus. Rigidity of the neck. Tenderness of the back.

The symptoms of meningitis became more marked and the patient died on May 13th.

Autopsy.—Purulent empyema of the sphenoidal cavities. Purulent thrombophlebitis of the cavernous sinus, of the superior petrosal sinus, of the bulb of the jugular vein and the neighboring parts of the sigmoid sinus, and of the jugular vein. Extensive subdural suppuration in the area of the sella turcica and of the left wing of the sphenoid. Purulent meningitis of the base extending to the convexity of the right hemisphere. Enormous hyperæmia of the pia. Pulmonary infarcts. Splenic tumor. Acute nephritis with abscesses.

A careful examination of the base of the skull revealed marked hyperæmia of the inner surface of the dura above the clivus and the surrounding parts.

On cutting into the hypophysis very thick pus was evacuated from the sella turcica.

Both frontal sinuses are found normal; also the maxillary antra.

There was a phlegmonous inflammation in the soft parts behind the left angle of the jaw.

This purulent infiltration extends upward to the base of the skull surrounding the internal carotid artery, which contains fluid blood and a parietal thrombus.

The internal jugular vein is thrombosed. The thrombosis extends into the bulb and then into the left sigmoid sinus.

The left petrosal sinus contains a disintegrated thrombus which continues into the left cavernous sinus.

The entire dural covering of this part of the base of the skull is separated from the underlying bone by yellowish-green purulent masses.

The left cavernous sinus is completely filled with pus.

The oculomotor nerve is surrounded by these purulent masses. The sheath of the optic nerve and the contents of the orbit appear normal.

The right sphenoidal cavity contains mucoid, fetid, purulent masses. In the left the mucous membrane is swollen; there is, however, a little pus in the deepest part of the cavity. Both ostia are very narrow, hardly permitting the entrance of the probe. There is no pus in the nose.

The left sphenoidal cavity shows a perforation in the sella turcica as large as the head of a pin in direct communication with the above-described enormous collection of extradural pus.

Remarks.—Baumgarten has reported a number of cases where prompt endonasal treatment has cured a severe orbital condition. I shall briefly quote two in which the ocular complications were removed after operating on the sphenoidal cavity.

Case 1. Paresis of the internal rectus and inferior oblique, with diplopia, following an affection of the sphenoidal sinus.

As there was no cause found for this diplopia, the patient was referred to the nose department. ("Acute Inflammation of the Eye Following Acute Affection of the Nose," *Monat. f. O.*, vol. xl., 5, 1906.)

The various accessory cavities were found normal, except the sphenoidal cavity. On probing this cavity a bloody fluid was discharged. At that same moment the patient said that she again saw as well as ever. The weakness of the two muscles disappeared completely.

Case 2. A girl eighteen years of age presented a recurring exophthalmos on the left side. The eye is otherwise normal. There is nothing found in the nose, but

from the experience in the preceding case it is decided to probe the left sphenoidal cavity. This was followed by the discharge of a great deal of bloody fluid. The patient said immediately that the eye had returned to its place, and during an observation of four weeks the old condition did not recur.

Baumgarten believes that chronic swellings in the nose had closed the sphenoidal ostium and that the retained secretion pressed upon the blood-vessels of the orbit. It would seem well to explore more frequently the sphenoidal cavity.

A case which resembles mine in many ways is that published by Finlay (these ARCHIVES, vol. xxxii.).

A young man had suffered from purulent otitis on the left side for several weeks. He was brought to the hospital in a comatose condition with paralysis of the external rectus and symptoms of stasis of the left ophthalmic vein. Below the upper orbital margin there was a swelling like a leech. The mastoid process was opened and the transverse sinus was exposed. Nothing abnormal was found. The middle cranial cavity was explored without result. The patient died.

At autopsy the skull and cavernous sinuses were occluded by a purulent thrombus, which continued into the left ophthalmic vein. The sphenoidal cavity and the posterior ethmoid cells were filled with thick, yellowish pus. There never had been any signs of a nasal trouble.

As to the individual symptoms of my case, many otologists, as Hinsberg stated in his introductory paper on "Labyrinth Suppurations" at the last meeting of the German Otological Society, do not differentiate between true nystagmus and nystagmus-like movements. Barany has suggested an "undulating" nystagmus and a "rhythmical" nystagmus. This choice of words seems to be happy, though we must more clearly define the term "nystagmus." In our case it was necessary to determine whether the nystagmus was the one which is

associated with paresis of the ocular muscles or with a localized cerebral trouble or with diseases of the vestibular apparatus. As the ear and the cerebellum were found normal, we were inclined to regard the horizontal nystagmus as a process of external ocular muscles. If the paralysis attacks any one muscle, the variety of nystagmus can be easily determined, but if there is a paresis of all the muscles, the distinction between this variety and vestibular nystagmus becomes more difficult. In cerebellar nystagmus this condition is usually a symptom of a tumor or of an abscess in the cerebellum. On the other hand, all processes in the posterior cranial fossa which decrease the space in this cavity may cause nystagmus, as meningitis and hemorrhages. Pressure on the vestibular nerve at the base of the brain must be thought of. Basilar meningitis and hyperæmia of the pia in our case, however, could not exert such a pressure. I am more inclined to regard the nystagmus in our case as being due to a process of the ocular muscles, though the vertigo and the tendency to fall to the left suggest the first explanation, especially as the facial nerve was also involved. The paresis of the ocular muscles and the ptosis can be easily explained by an involvement of the nerves near the sphenoidal cavity. The relations of the oculomotor nerve to the pupils and to the lens have been described. The vision and field were not examined.

Neuralgia appeared in a peculiar form; the floor of the frontal sinus was very tender, although at autopsy the frontal sinuses were found normal.

The progress of the meningitis was also shown by the later appearance of Kernig's sign.

The pain and swelling along the left side of the neck and over the apex of the mastoid process with a negative aural condition resulted probably from an infection secondary to a purulent thrombosis of the jugular vein. In our case the pus had travelled from the interior of the skull to this area through the foramen ovale along the third branch of the fifth nerve.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By THOMAS J. HARRIS, M.D. SECRETARY.

MEETING OF MARCH, 26, 1907.

Dr. BRYANT reported a case of **carcinoma of the middle ear**.

Male, forty-one years old, with history of old otorrhoea, presented a polypoid growth in the left external auditory canal, indefinite pain in the head, paralysis of sixth and seventh nerves. The growth was removed by a curette and found to occupy the depth of the auditory canal, arising anteriorly, external to drum-membrane. Examination showed it to be carcinoma. The radical operation was performed, followed two weeks later by recurrence. This was then treated by radium, with no improvement. The headache became worse; the growth extended into naso-pharynx, nose, and orbit, involving the fifth, sixth, seventh, tenth, and eleventh cranial nerves. Death after six months. No autopsy.

Discussion.—Dr. GRUENING said that when he saw the case there was a herpes of the face which in his opinion indicated the involvement of the Gasserian ganglion and suggested that the disease may have proceeded from inside outward.

Dr. ARNOLD KNAPP said that when he saw the case in June of last year there was only a paralysis of the 6th nerve; there was nothing to call attention to any involvement of the ear. He also referred to a case of a tumor presenting in the external auditory canal which he had seen where there was a similar paralysis of the 6th nerve.

Dr. WILSON stated that there had been no recurrence in his case of carcinoma of the ear which had been treated with radium.

Dr. DENCH referred to a case of an infant who had, in connection with disease of the mastoid, a fibroid growth of the auditory canal. The operation showed small round-cell sarcoma of the mastoid and canal. The wound had nearly healed when the child disappeared from the clinic. Later it returned with the external wound entirely healed, but a discharge still from the ear. The child had had X-ray treatment, he learned. He then tied the common carotid to check, if possible, the growth of the sarcoma. The child, however, finally died.

Dr. DENCH spoke also of a case where the microscopic examination showed epithelioma. There was no recurrence after operation, illustrating the fallacy of the microscope at times.

Dr. MAY reported a case of **anomaly of the lateral sinus**, occurring in a child of six. The usual mastoid operation was performed. After the operation the temperature continued elevated and somewhat suggestive of sinus involvement; respirations 38, and pulse 128. At the end of a week a second operation was performed. The sinus was exposed and was found normal above the entrance of the emissary vein. Below this point there was the appearance of a diseased sinus. An incision showed, however, that this was dura, and a quantity of cerebro-spinal fluid escaped. The jugular was then ligated and excised; it was found to be very small and contained a little blood, the examination of which was negative. Further exploration did not discover the remaining portion of the sinus and he was forced to the conclusion that it was absent in this locality. After the operation the temperature dropped to normal and continued so, and the patient made a complete recovery.

Discussion.—Dr. GRUENING said that he had seen the operation and at first thought that the escape of cerebro-spinal fluid indicated that the incision was between two thrombi in the sinus, a condition which he had seen. The disappearance of the sinus below he regarded as a pathologic condition and not as an anatomical anomaly.

Dr. DENCH said that he had seen such obliteration of the lateral sinus in a case of chronic middle-ear suppuration.

Dr. PHILLIPS reported a case of **tumor of the face** in a girl

of ten. This had existed for some time and gradually grown till it had separated the cartilaginous from the bony attachments of the external auditory canal. It now involved the canal itself and extended half forward on the jaw.

Dr. PHILLIPS spoke of the favorable result of **firm compression over the two internal jugulars**, in a case of brain abscess, during operation, to evacuate the pus. This had been effectual in draining off over one and a half ounces. In a second case where the method was used the result was equally good.

Dr. PHILLIPS in answer to an inquiry said that of the two cases of mastoid operation complicated by diabetes the woman with a high percentage of sugar had not done satisfactorily; the wound was very slow in healing.

Discussion.—Dr. KIPP reported the case of a child who had a large furuncle in the external canal of the left ear and who suffered from diabetes. An incision was done under ether. The child died twelve hours later in coma.

Dr. MCKERNON reported the case of a girl of sixteen who had 4.61 per cent. of sugar in the urine and upon whom he had operated for acute mastoiditis. For six hours following the operation she suffered from coma. After that she became better and recovered without any complications. There was at present 2.5 per cent. of sugar present. He had now seen 13 cases of mastoiditis complicated by diabetes where he had operated, with nine recoveries. He felt that the presence of sugar was no indication in itself against operating.

Dr. DENCH agreed with the views of Dr. McKernon.

Dr. E. F. KRUG reported a case of **acute mastoiditis** complicated by 4 per cent. of sugar. Blebs in the canal hid the drum membrane, which was later seen to be pushed forward by blood in the middle ear. An ice-bag relieved the condition. A similar condition developed in the other ear and two weeks later an abscess in the ear first involved. This was still discharging, though better. Age of patient sixty-nine years.

Dr. GRUENING said that in the cases of diabetes with involvement of the mastoid, the prognosis was distinctly bad when the soft parts were affected. Four Bezold mastoids had proved fatal in his hands. The age of the patient was not so serious a factor.

Dr. LUTZ referred to a case of Bezold mastoid with a trace of sugar in a patient of seventy-seven where there had been a rapid recovery.

Dr. DENCH emphasized the importance of an early operation and the seriousness of a long-standing suppuration.

Dr. KIPP thought that the chief risk was from the anæsthesia.

Dr. MCKERNON stated that he always employed chloroform in these cases.

Dr. QUINLAN reported upon a high temperature following an operation for **hypertrophied tonsils and adenoids** in a child of nine years. At the end of two weeks the temperature shot up to 105° with morning rise and evening fall. This lasted for 5 days. Earache manifested itself during this period; canal swollen and drum slightly injected along the handle of the malleus. Blood examination: leucocytosis of 19,000; a subsequent examination made 4 days later showed a count of 11,000; slight mastoid tenderness. A diagnosis of influenza was made by the consultant and this was subsequently verified by the perfect recovery of the child, who is now, 5 weeks later, running a normal temperature. Every indication at the time pointed to an acute invasion of the mastoid.

Discussion.—Dr. DENCH referred to a case of adenectomy which was followed by adenitis and later by acute suppuration of both ears. A temperature of 106° suggested sinus involvement, but the next day this dropped to normal.

Dr. BRYANT spoke of a case of acute otitis media where the polynuclear percentage was 87 and yet an uneventful recovery took place.

Dr. GRUENING said that he did not think that the blood examination could in any way supersede a careful clinical examination nor be compared in value to it.

Dr. KIPP reported a case of cerebro-spinal meningitis in a child of three where the **value of an ophthalmic examination** was illustrated. The child was supposed to be suffering from meningitis. The spinal puncture gave a negative result. The ear had been discharging but was then entirely healed. The child was, however, totally deaf in both ears. The eye examination showed a metastatic irido-choroiditis, which established the diagnosis of cerebro-spinal meningitis. Recovery.

Dr. KIPP also reported a case of otitis media suppurativa of

right ear with double vision. There was a **paralysis of both external recti**. The operation showed an extensive mastoiditis and an extradural abscess containing three drachms of pus. After the operation the paralysis disappeared. He did not pretend to explain the cause of the paralysis.

Discussion.—Dr. DENCH thought that a localized meningitis could account for it.

Dr. ARNOLD KNAPP inquired as to the significance of **persistent pain in the post-mastoid region**. Did it necessarily demand operation in the absence of other symptoms?

Discussion.—Drs. BRYANT and KIPP thought that operation could often be avoided in such cases.

Dr. GRUENING thought that pain in this locality demanded operation if persistent.

Dr. DENCH thought that it was a suspicious sign; it was seen in cases of grippe; it did not call for operation always.

Dr. KNAPP said that the case that he had in mind had a discharging ear for four weeks. This had now practically ceased but there was deep œdema in the posterior triangle; there were no other symptoms of mastoid involvement.

Dr. DENCH thought that œdema in this region always called for an exploratory operation.

Dr. HARRIS referred to a case which he had reported last year, where the pain had persisted for a number of days in the posterior portion of the mastoid and recovery finally took place without operation.

Dr. SHEPPARD spoke of a case with a large area of œdema over the post-mastoid region. The operation revealed a mural thrombus of the sigmoid sinus and the emissary vein blocked.

Dr. GRUENING thought that such cases were the ones that were benefited by the Wilde's incision.

Dr. DENCH reported a case of double mastoiditis. In the course of the operation the sinus was exposed on one side. After the operation the polynuclear count rose, then dropped, and rose again. The supraclavicular glands on the opposite side became involved and were excised under ether. The temperature immediately shot up, and the vein on the side corresponding to the sinus which had been exposed was ligated and a portion excised. The clot which it contained

was found to be sterile. After this the temperature became normal. The Doctor ascribed the fever which had occurred to the infected glands.

Dr. LUTZ spoke of a case of acute otitis media which was followed by an involvement of the other ear. Later a double pneumonia and double mastoiditis developed, and recently he had operated on the patient for an extensive disease of the accessory sinuses of the nose. To-day he is well but is totally deaf.

Dr. DENCH inquired if ice had been used.

Dr. LUTZ said that he had used it for 24 hours.

A general discussion took place which showed that the members, almost without exception, had abandoned the use of ice in cases of mastoiditis.

Dr. LUTZ said he used ice in cases seen very early, before the presence of pus was apparent. After pus is present ice is of no use.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

REGULAR MEETING, MARCH 8, 1907. DR. WENDELL C. PHILLIPS,
CHAIRMAN.

Presentation of Cases.

Dr. W. P. EAGLETON presented a case showing the presence of von Stein's symptom. The patient, a young girl, had a running ear, which gave her so little trouble that she paid no attention to it. Eight weeks ago, she was seized with a "fainting spell" and fell, but did not lose consciousness. This was followed for several days by nausea, tinnitus, vomiting, and dizziness. Forty-eight hours later she had a marked facial paralysis, and a great increase in the discharge from the ear.

When first seen by Dr. Eagleton, she had become totally deaf in one ear with very marked facial paralysis; had recovered entirely from the dizziness, but was unable to stand on either foot with her eyes open.

She improved rapidly and now, eight weeks after the attack, all the symptoms of facial paralysis have disappeared, she can stand on either foot for several seconds, but is still unable to jump with her eyes open or closed, but can do better with them open than closed. Having done this several times during the last few weeks she can now do it very much better. (Demonstration.) She shows a typical point to which Dr. Eagleton would like to call notice particularly, viz., the feet come forward unevenly, so that after one or two jumps she has to catch herself by throwing one foot out. When she first

tried this she could jump only once and would then fall towards the opposite side.

Dr. BRYANT presented a patient with a small **granulating area** on the upper margin of the oval window just below the facial canal. The patient was a woman forty years of age, very neurotic, who had had a radical operation successfully performed two years ago. There was now some headache, vertigo, and tinnitus. The amount of discharge was slight and not purulent.

Discussion: Dr. PHILLIPS inquired if the patient's eyes had been examined, as this is a differential point of some value. Dr. BRYANT replied in the negative, and in response to another inquiry replied that the granulating surface had not been curetted as he had been watching to see what would develop.

Dr POOLEY inquired whether the discharge had been examined bacteriologically and by the microscope, and said that he presumed Dr. Bryant had in mind that the discharge came from the labyrinth.

Dr. BRYANT replied to both questions in the negative.

Dr. POOLEY suggested the possibility of a fistula in the labyrinth.

Dr. BRYANT replied that he did not think the discharge had been sufficient to warrant that supposition. At least if there was a fistula in the bone it had been protected on the inner side.

Dr. RICHARDS inquired whether the stapes was still in position, to which Dr. BRYANT replied that he did not know. Dr. Richards then said that he would like to mention a little experiment which he had often tried and which he thought might be of value in certain cases in determining whether or not the labyrinth was involved in a gross pathological change. By introducing gentle intermittent pressure upon the capitulum of the stapes, with the patient under slight anaesthesia, a nystagmus is often made manifest if the interior of the labyrinth is not destroyed. Frequently no nystagmus is noted, but should it occur it would indicate that the labyrinth is functioning and would rather point against its extensive involvement. As the cases of labyrinthine suppuration which he has seen show that the interior of the labyrinth may be involved without any demonstrable lesion in the external

capsule (infection by local extension), the test has a definite field of usefulness.

Dr. POOLEY inquired whether this symptom of nystagmus had been recorded or was an observation made by Dr. Richards himself. To which Dr. RICHARDS replied he had never seen any mention made of the pressure upon the stapes with this end in view, but took for granted that it was a recognized fact that nystagmus might be produced in this way.

Dr. MEIERHOF said that it was difficult to speculate upon the condition, and he did not think it could be determined except by cutting into the ear. There was exquisite tenderness over the mastoid, but much of this might be due to hysteria.

Dr. PHILLIPS said that he had operated the previous week on a chronic case and found some granulations about the window, but could not find the stapes. Some years ago he had performed ossiculectomy upon the same patient. He operated because of the great pain which the patient suffered, due probably to eburnation. During the operation he had made pressure over the oval window.

Dr. THOMPSON said that there was one slight movement but no oscillation of the eye.

Post-mortem report of case of suppurative disease of internal ear. T. R. POOLEY, M. D.

Inasmuch as the opportunity for a thorough post-mortem examination, together with examination of the temporal bone in suppurative disease of the internal ear, must be comparatively rare, I have thought that I could not better add to the interest of the subject under discussion this evening, than by reporting a case which came under my observation many years ago:

Miss L., twenty-three years of age, had suffered from ear-ache and otorrhœa since childhood. The discharge would cease for a time, then after severe pain recur. The last attack of this kind, which she said began about four weeks previous to the time I saw her, was accompanied by distinct cerebral symptoms, nausea, vomiting, and vertigo. S. P.: Face pale and very much emaciated, with a chronic cough, and physical evidences of phthisis pulmonalis. Her mother died of phthisis. She complained of constant pain in the ear and vertex. There

was a slight but offensive otorrhœa, which suggested by its smell the presence of diseased bone. She complained of a very distressing vertigo, which was always aggravated when assuming a recumbent posture. There was facial paralysis on the same side as the diseased ear. Examination of the ear after cleansing, showed a large linear-shaped perforation of the anterior-inferior quadrant of the membrana tympani. The mucous membrane of the promontory, which was fully exposed, was pale, and there were several spots of hemorrhage upon it, as well as upon the remnant of membrane. There was no evidence of any inflammatory action in the appearance of the middle ear, nor was the mastoid region either painful or swollen. H = 0. V = 5/60.

I ventured the diagnosis of extension of the ear disease to the brain, abscess of the cerebellum, and made an unfavorable prognosis. The propriety of opening the mastoid was considered, but the operation rejected as not likely to do any good, as the extension was evidently not by this way. All the symptoms became rapidly worse. The pain was intense, the vertigo such that the patient thought the bed was going round, and although she was excessively weak, she assumed an upright posture most of the time for the relief of this symptom thus afforded. She retained her consciousness until only a few hours before her death. Vomiting was throughout a very distressing symptom. Death took place just one week after I first saw her. Treatment was merely palliative. Steaming the ear gave her more relief than anything else.

The post-mortem was made twenty-four hours after death.

Upon removing the calvarium, an abscess about the size of an English walnut, with a well-formed pyogenic membrane, was found in the left hemisphere of the cerebellum. When opened, it gave issue to most offensive pus. No abnormality of any other part of the brain was found. The abscess itself was distinctly circumscribed, and there was no softening of the brain substance in its vicinity.

The temporal bone was removed for dissection. No evidence of necrosis of the inner surface of the bone could be found, but the part which lay in apposition with the abscess was blackened. The temporal bone, which was kept in Müller's fluid, was examined several months afterwards.

No evidence of necrosis of the surface of the bone; that portion corresponding to the eminences of the cochlea and superior semicircular canals perfectly normal in consistency and appearance. Perforation of the membrana tympani in its anterior-inferior quadrant. The portion of the membrane still existing seemed to be only newly formed connective tissue (probably healed perforation). The auditory canal was opened by sawing in an antero-posterior direction, just in front of the attachment of the drum-membrane, when a small purulent cavity, situated above and behind the tympanum, and communicating with the latter immediately behind the attachment of the membrana tympani, was laid open. No ossicles were present. The mucous membrane was thickened and covered the promontory. The latter was smooth and healthy. At the posterior portion of the necrotic bone and purulent mass lies the facial nerve, which is softened and diminished in volume, while above this point it is quite healthy. The tendon of the tensor tympani was attached to the thickened part of the mucous membrane in its upper portion. The cochlea was opened into by a strong knife. The modiolus was entirely destroyed except at its base; the septum between the three coils was preserved. The soft parts of the vestibule were entirely wanting. The horizontal semicircular canal was absent; the anterior vertical one contained pus, but was still lined by membrane; the superior vertical contained pus, but no lining membrane.

The walls of the vestibule and the bony canals were smooth and surrounded by ivory healthy-like bone. Both the saccule, utricle, and superior and horizontal canals absent; membranous part of the anterior canal present, but bathed with pus, which extended into the vestibule. A bristle passed into the aqueduct of the vestibule failed to reach the surface of the bone. The internal auditory meatus was examined; both nerves at this point healthy, all the other parts of the canal being healthy.

No trace of a necrotic path communicating with the cavity of the skull could be found. The abscess of the cerebellum was probably not of recent origin, since it had such a well marked thick pyogenic wall. Is it not probable that each of the oft recurring attacks of pain, to which the patient re-

ferred, was due to cerebral irritation which lasted for a few days and then passed away, but finally by repeated attacks gave rise to the formation of an abscess?

Another point of interest is the simultaneous existence of labyrinthine and cerebellar disease. I made the diagnosis of the seat of the intracranial disease from the vertigo and unsteadiness of gait. May this not, however, just as well have been caused by the disease of the semicircular canals? I am sorry that I did not notice more particularly whether the staggering in walking was towards the affected side, as this might have enabled me to have included the probability of the inner ear being disorganized in my diagnosis. But I only saw the patient once before she took to her bed, and then forgot to make the inquiry.

Dr. HARMON SMITH reported a case of **chronic otitis media suppurativa syphilitica**, in which he had removed the internal ear, the report of which had appeared in the *New York Medical Journal*, March 17, 1906.

Dr. RICHARDS said that he had recently operated upon a case presenting some interesting features.

A middle-aged woman, five weeks prior to operation had acute earache, high-pitched hissing noise in the ear, and marked dizziness with a tendency to fall backward. In a few hours, aural discharge and symptoms of mastoiditis supervened. The vertigo continued through the succeeding weeks.

Prior to operation there were vomiting, marked nystagmus, loud noise in the ear, and vertigo. The tendency now was to fall toward the involved side. There was profound deafness with absence of both air and bone conduction.

Operation revealed involvement of the vestibule, semicircular canals and the lower half of the first cochlear whorl. During anaesthesia the nystagmus, which had previously been marked, did not disappear until the semicircular canals had been removed, when it ceased.

Upon emergence from anaesthesia the patient experienced no dizziness, the noise had disappeared and there was no further vomiting, the eyes were steady except when directed to the extreme lateral position of the uninjured side.

Internal-ear symptoms simulating intracranial abscess, following traumatism to middle ear. JOHN McCoy, M.D.

Israel I., age thirty-three years; married; native of Russia; was admitted to the service of Dr. John L. Adams at the N. Y. Eye and Ear Infirmary, December 15, 1906.

Has never had any ear trouble prior to the present attack. About three weeks previous to entrance he had an earache in the right ear. The ear drum was incised by a physician, and the ear discharged freely until two days before entering the hospital when the discharge ceased and the pain in the ear returned. His physician was called in again, and this time made four incisions in the drum, using some force and causing severe pain. This was in the morning. That afternoon he attempted to work in his shop (he is a barber by occupation), when he found that he was unable to stand on account of dizziness. He had also headache over the right side of the head. He went to bed, and while in bed that night and the next day and night felt nauseated and vomited twice. His family noticed also that he was drowsy, and that his speech was slow and interrupted. The following day he was brought to the hospital.

Upon examination his countenance appeared dull and apathetic, and on being questioned his cerebration was markedly slow. He spoke in a slow and interrupted manner (scanning speech), and complained of dull headache over the right side of his head.

Examination of the right ear showed no changes externally, no mastoid tenderness. The external canal walls were excoriated and the canal was found to be filled with pus. The membrana tympani was very red and lacerated-looking, and the pus seemed to be escaping from the posterior-inferior quadrant. His hearing was materially diminished, hearing the spoken voice about six feet from the ear. He noticed ringing noises before the paracentesis, but they assumed a different character when the dizziness came on, being musical. The left ear was normal.

Examination of the eyes showed a well-marked horizontal nystagmus of both eyes, and the right pupil was contracted somewhat; and while both reacted to light and accommodation, the right pupil was more sluggish in its action. Both undi were normal. The patellar reflexes were normal on both sides, and all other reflexes were present and normal. His

coördination was good for touching the tips of the index fingers, and for touching finger to nose, although somewhat slow. On making an attempt to walk, he walked markedly to the right, and after taking six or eight steps would fall to the right side unless prevented. Physical examination of heart, lungs, and kidneys was negative. His temperature on admission was 100° F.; pulse 36; respiration 28. The examination of his blood on admission showed: red blood cells 5,500,000; leucocytes, 11,000; haemoglobin, 92 per cent.; polynuclear cells, 75.8 per cent.

The examination of the aural pus showed a mixed infection, largely staphylococcus.

The patient was put to bed, irrigations given to the affected ear, and dry cold applied to the head. Under this expectant treatment he showed a steady abatement of all symptoms, and a final disappearance of all, except a slight discharge from his ear, when he was discharged from the hospital, January 4, 1907, having been in the hospital nineteen days. He returned to the out-patient department, and his ear discharge ceased about January 30, 1907.

Dr. MEIERHOF said that for the benefit of those who had not seen it, he would like to call attention to a very exhaustive treatment of this subject in the *Transactions* of the German Otological Society of last year (1906). "Labyrinthine suppuration," by V. Hinsberg, p. 30. It is one of the most complete articles on the subject that has ever been published.

Dr. Meierhof did not think that the cases that had been reported this evening showed positive evidences of labyrinthine suppuration. There was evidence of some kind of pressure—intratympanic—either from gas, granulation tissue, pus, or what not. We get many of these symptoms in cases of inflammation of the middle ear, and patients get well without an operation, but real cases of purulent involvement of the labyrinth are very serious and mostly are demonstrated only at operation.

Dr. POOLEY asked how it could be explained that the complete exenteration of all the temporal bone, removing all the structures of the inner ear, would do away with the essential symptoms of labyrinthine disease—the dizziness, nausea, and ataxia. This is the essential symptom. The disease

destroys the labyrinth. How then can it be explained that the operation, doing essentially what the disease does, does away with this symptom? He would like to have this point brought home to his mind so that he can understand and believe it.

Dr. CHAMBERS commented upon the progress which had been made in the knowledge and surgical treatment of internal-ear suppuration during the last six or eight years.

Dr. RICHARDS replied that the opening of the labyrinth was a very serious thing. He had operated upon ten cases and had lost three. He had been struck by the frequency with which infective sinus thrombosis complicates labyrinthine suppuration, existing in three of the ten cases mentioned. He did not feel that it was a justifiable procedure to open the labyrinth upon symptoms, as vertigo, vomiting, nystagmus, etc., are so often due to causes entirely extra-labyrinthine.

In answer to Dr. Pooley's question as to why removal of the arches of the semicircular canals, the vestibule, and the first whorl of the cochlea, in the case mentioned, did away with the symptoms of vertigo, nystagmus, and disturbed equilibrium, he did not know, but merely recorded it as a fact.

Dr. EAGLETON said that he had hoped to bring another patient before the Section to-night, who had been operated on for labyrinthine suppuration, but the patient had left the city. He had therefore brought the one whom they had seen.

Dr. Pooley had asked why these cases recover from their dizziness and peculiar gait. This is a very pertinent question. They do recover, and the explanation is very simple. The labyrinth is really a part of the cerebellum. It is one of the tracts which leads to the cerebellum, and has to do with co-ordination. As long as the labyrinth is a source of irritation, it irritates the cerebellum, causing vertigo, but by removing or draining the labyrinth, the irritation is removed, so curing the vertigo, nystagmus, etc.

Paper.

The value of von Stein's symptom in the diagnosis of labyrinthine suppuration. W. P. EAGLETON, M.D. (Published in full on pp. 257-262 of this issue.)

Discussion: Dr. RICHARDS said that he had been very much interested in Dr. Eagleton's paper, but that the test to which he referred was subject to numerous errors. If, for instance, a patient is made to jump as indicated, with the eyes closed, he may tend to fall from a variety of causes independent of any labyrinthine disturbance. First, through any irregularity of muscular action of the two sides, as to hesitation due to fear of falling—a badly arched foot, irregularity in length of limb. A patient, if he be right-sided (handed), attempting to jump in a straight line as in the test mentioned, will deviate to the left and eventually so tend to fail if the eyes are closed. Under normal conditions he is kept in alignment, and in a condition of equilibrium, through his ability to orient. With the eyes closed (as in the test), the supporting influence which orientation gives to the preservation of equilibrium is cancelled. As a result, a disturbance of the statical sense occurs, which may be totally independent of a labyrinthine lesion.

Second, as the patient hops along, he is not in contact with the floor a sufficient length of time to gain a correct subjective appreciation (through what we may term the muscular sense) of his proper relation to the objects about him, or to the floor upon which he moves. The test consequently tends to produce a condition of disturbed equilibrium by disconcerting the muscular sense.

Von Stein's test is not only subject to many errors, but it makes no attempt to test the patient's statical sense with reference to definite planes corresponding to the primary planes of the semicircular canal system. It has a tendency also to create a condition of inequilibrium by disconcerting the muscular sense and by suppressing orientation; if, therefore, upon applying the test a condition of disturbed balance is made manifest, we are at a loss to know what factor is responsible; in other words, the test is not a differentiating test.

Further, if the invasion of the labyrinth has been gradual, thus giving the remaining factors (whatever these may be) sufficient time to compensate for the loss, no disturbance of equilibrium may be made manifest by the application of von Stein's test.

In several cases in which he had removed the major portion

of the labyrinth, the patients subsequently do not respond to von Stein's test.

In testing labyrinthine cases, we wish to disturb to a minimum degree all other factors concerned in the preservation of equilibrium. We therefore have the patient first stand with eyes open and note the direction in which he tends to fall. If disturbance of station follows, we may, if we find the labyrinth involved, attribute the disturbance to the definite lesion by elimination.

We next repeat the test with the eyes closed.

If no disturbance of equilibrium is made manifest, we now have the patient stand and move the head as a pendulum upon the body in the planes of the semicircular canals, testing his station with reference to each plane separately.

The eyes should be closed, as moving objects in the field of vision may be a factor in producing dizziness. We here, too, cancel the supporting influence which the eyes contribute to the preservation of station, but with the patient standing still, *i.e.*, with the muscular sense undisturbed, this supporting influence is not so necessary as when the patient is made to jump, as in von Stein's test.

Should no disturbance of equilibrium follow, we should now have the patient stand with eyes closed and rotate the head in such direction as to cause disturbance of the labyrinth fluid with reference to the combined planes of the canals. This quickly causes an exquisite degree of vertigo even in the normal individual.

We should select some given point as the chin, for the sake of uniformity, and state when making the test in which direction this point is made to move—as under normal conditions the chin when rotated from left to right causes the patient to fall to the left, and *vice versa*, the head being rotated as mentioned above.

If after testing a patient and tabulating the resulting disturbances of equilibrium and noting the pathological lesion in the labyrinth and the part of the labyrinth involved we may hope to make some progress in labyrinthine localization.

Dr. T. R. CHAMBERS inquired concerning the age of the patient. If the patient were sixty years old, would the symptom be of service?

Dr. EAGLETON said that Dr. Richards proposes a substitute for von Stein's symptom but gives no data. On the other hand, with von Stein's test he had diagnosed eight cases of labyrinthine suppuration without other symptom and operated upon them at the Newark Eye and Ear Infirmary.

There have been seven cases of labyrinthine suppuration, in five of which von Stein's symptom was known to exist. It probably existed in all seven, but they were tested long after drainage of the labyrinth, and the symptom had disappeared.

Dr. Richards had spoken of its being very dangerous to enter the labyrinth. It certainly is, if an attempt to extirpate the labyrinth is made; but if a fistula is found and carefully followed until the end of granulations is reached, without ever probing beyond what is actually seen, the procedure is safe. Excellent results had been attained at the Newark Infirmary in this way, viz., leaving the granulations alone, and simply enlarging the fistula as far as possible so as to have free drainage without disturbing healthy labyrinthine tissue.

In all the cases which had been operated upon, there had been only one death, and this was a tubercular case which died some time later.

He had not spoken of von Stein's goniometer for he had had no personal experience with it.

Von Stein uses a special apparatus on which the patient is placed with the feet close together, with eyes open or closed. Von Stein has found in a number of cases that he can diagnose the particular canal which is involved, but they all have a limitation of the angle of inclination.

He simply brought von Stein's symptom forward as one that should be tried in every case where labyrinthine suppuration is suspected.

The patient that he hoped to bring this evening was a Greek with a chronic running ear, but no other symptoms, but because he could not jump, suppuration of the labyrinth was suspected, and he was operated upon and the labyrinthine suppuration was found.

Dr. PHILLIPS said that he had seen the case which Dr. Richards had reported, and the patient could not jump and could not stand on one foot.

Dr. EAGLETON said that he had been careful to mention that the symptom occurs in Ménière's disease, and in all affections involving the labyrinth. If we would only think of the semi-circular canal not as a separate organ, but as being an end arm of the cerebellum, which it really is, but which can be cut off without injuring the cerebellum, we would simplify matters. As long as it is irritated it gives symptoms, but when the irritation is relieved the symptoms cease.

REPORT ON THE PROGRESS IN OTOLGY DURING THE THIRD QUARTER OF THE YEAR 1906.

BY PROF. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

217. ZUCKERKANDL. *On the anatomy of the Eustachian tube.* *M. f. O.*, 1906, Nos. 1, 2, and 9.

218. ONODI. *On the membranous parts of the so-called fontanelle of the middle meatus.* *Arch. f. Laryngol.*, vol. xviii., 3.

219. BOENNINGHAUS. *On the present status of Helmholtz's resonance theory.* *M. f. O.*, 1906, No. 3, p. 140.

217. ZUCKERKANDL. *On the anatomy of the Eustachian tube.*

This is a continuation of previous publications on this subject. The author has examined the anatomical peculiarities of the Eustachian tube in an additional series of vertebrates of various species. In the grouping of the varieties of Eustachian tubes, the greatest difference has been found in the structure of the tubal walls, especially of the median wall. While the lateral wall in all species has an approximately uniform appearance and is usually fibrous, the median wall shows numerous transitional forms, from fibrous to cartilaginous. This fact, that in the lower forms of vertebrates the median wall is usually fibrous, shows that the primitive form of the Eustachian tube was represented by a fibrous tube.

WITTMACK.

218. ONODI. *On the membranous parts of the so-called fontanelle of the middle meatus.*

With the aid of eleven diagrams the relations in the middle

meatus are described, and it is shown that the opening of the maxillary ostium varies in size, and that numerous variations exist as regards the accessory openings. VON EICKEN.

219. BOENNINGHAUS. *On the present status of Helmholtz's resonance theory.*

This is a brief review of the views of various authors of the Helmholtz resonance theory, and a description of the author's personal investigations and views which have appeared in previous publications. WITTMAACK.

GENERAL.

a.—REPORTS.

220. DALLMANN and ISEMER. *Annual report of the University Ear Clinic in Halle, from April 1, 1905, to March 31, 1906.* A. f. O. 69, pp. 44-94.

221. HASSLAUER. *Remarkable cases from the Aural Wards of the Military Hospital in Munich during 1904-05.* D. militär. Zeitschrift, 1906, No. 9.

220. DALLMANN and ISEMER. *Annual report of the University Ear Clinic in Halle, from April 1, 1905, to March 31, 1906.*

In this year 2876 patients were treated for 3679 diseases, 602 operations were performed (of which 54 were typical and 108 complete mastoid operations). In the hospital proper, 299 patients were treated, with 10,967 days of treatment.

In addition to the 16 fatal cases, an interesting case is described where, after an apparently simple middle-ear suppuration with periostitis of the mastoid process, there was a large extrasinuous abscess of the posterior cranial fossa found at operation. Four days later the jugular vein was ligated and the sinus opened on account of pyæmic symptoms. The fever continued, apparently caused by a suppuration in the bulb. Owing to the poor condition of the patient, an operation on the bulb was not undertaken. Nevertheless, improvement and recovery. Of the fatal cases five deserve attention, in which death was the result of operations performed upon the patients (in two cases a typical mastoid operation; in two, complete mastoid operations; in one, sclerotomy). In three the extension of the suppuration took place through the oval window, the labyrinth, and the internal

meatus to the meninges; in one case probably the horizontal semicircular canal was injured at operation. ZARNIKO.

221. HASSLAUER. *Remarkable cases from the Aural Wards of the Military Hospital in Munich, during 1904-05.*

In 14 cases of 53 acute otitis media, an operation had to be performed on account of absolute indications. In two other cases the transverse sinus was found directly adjacent to the posterior canal wall, so that the antrum could not be explored. Subsequent exposure of the antrum was not made necessary because the cases recovered. The following cases are fully reported: 1, acute otitis; abscess of the temporal lobe; death. 2, acute otitis; serous meningitis; recovery. 3, acute otitis after measles; perisinuous abscess; recovery. 4, chronic otitis; perisinuous abscess; recovery. 5, cholesteatoma; operation. 7, acute otitis; osteophlebitis; pyæmia.

BRUEHL.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

222. HABERMANN. *On so-called professional deafness.* *A. f. O.*, 69, pp. 106-130.

223. JOUTY. *Deafness after epidemic cerebrospinal meningitis.* *Annales des mal. de l'oreille*, etc., April, 1906.

224. HAMMERSCHLAG. *A case of neurofibromatosis (Recklinghausen's disease) with involvement of the ear.* *M. f. O.*, 1906, No. 5, p. 309.

225. FEIN. *The importance of the lower turbinal in the patency of the nose.* *M. f. O.*, 1906, No. 1, p. 16.

226. JERUSALEM and FAULKNER. *On labor pains and their relation to the nose.* *Wiener klin. Wochenschr.*, No. 15, 1906.

227. BERNHARDT. *On general infections after operations on the nose and pharynx.* *Inaugural Dissertation*, Rostock, 1905.

228. URBANTSCHITSCH. *On reflex epilepsy.* *Wiener klin. Wochenschrift*, No. 39, 1906.

229. HENNEBERT and TRÉTROP. *On the objectively perceived entotic noises.* *Annal. des mal. de l'oreille*, etc., July, 1906.

230. KUTSCHER. *On examinations of the naso-pharyngeal cavity in healthy man for meningococci.* *Deutsche med. Wochenschr.*, No. 27, 1906.

231. KRIEGER. *Pain in the ear and in the mastoid process in hysterical subjects.* *Inaugural Dissertation*, Rostock, 1906.

232. CELIO. *Reflex cough in teething children. A contribution to the physiology of sleep.* *Österreichische Ärzte-Zeitung*, No. 13, 1906.

222. HABERMANN. *On so-called professional deafness.*

This report includes the clinical examination of 107 cases and the microscopic examination of ten ears which belonged to five cases of professional deafness. In the latter there always was an atrophy of Corti's organ, especially in the lower part of the cochlear base and the vestibular part of the cochlea. These changes are regarded as primary, the degeneration of the auditory nerve fibres as secondary. ZARNIKO.

223. JOUTY. *Deafness after epidemic cerebrospinal meningitis.*

Five case-histories without bringing anything new. The cases were observed during an epidemic in Algiers in 1905.

BOENNINGHAUS.

224. HAMMERSCHLAG. *A case of neurofibromatosis (Recklinghausen's disease) with involvement of the ear.*

This is a case of neurofibromatosis with involvement of the external and middle ears. In the external ear there was a marked stenosis of the auditory canal and an absence of cartilage. The changes in the middle ear were those of chronic catarrh. The causes for the latter condition are to be found in the congenital changes in the course of the cartilaginous membranous tube which prevented normal ventilation of the drum cavity.

WITTMAACK.

225. FEIN. *The importance of the lower turbinal in the patency of the nose.*

These investigations depended entirely upon clinical observations. The authors found that the lower turbinal exerts a large influence upon the quantity of the respiratory current. Before undertaking operations on the lower turbinal the importance of each individual part of this bone must be recognized. The enlargements especially of the anterior and posterior extremities influence the quantity of the expiratory air and occasionally change the direction of the current. Moreover, its action in the form of a valve must not be overlooked.

WITTMAACK.

226. JERUSALEM and FALKNER. *On labor pains and their relation to the nose.*

The authors irritate the nose in order to artificially produce

labor pains in protracted labor or in abortion or to induce premature labor. The irritant is applied either—1, by the simple probe, when the so-called "genital zones" of the nose are gently massaged; 2, by the faradic current on these spots; 3, by the galvanic current for the electrolysis of the lower turbinal. Irritation in the lower turbinal caused pain in the uterus, while irritation of the tubercula septi produced pain in the small of the back. This is unquestionably a motor reflex from the nasal mucosa to the uterus. At the same time, practically, nasal irritation with the galvanic or faradic current cannot be compared with the other means of inducing labor. Good results, however, were obtained by influencing the severity of the labor pains by cocaineizing the so-called "genital spots" in the nose, especially in those cases suffering from dysmenorrhœa.

WANNER.

227. BERNHARDT. *On general infections after operations on the nose and pharynx.*

Eight cases are reported where, after removal of the pharyngeal tonsil, and in two of posterior hypertrophy of the inferior turbinal, scarlet fever appeared. He concludes that this disease is a particular variety of surgical scarlet fever which is characterized by the fact that the traumatism occurs in that place where usually the infection takes place in scarlet fever. The period of incubation is roundly 48 hours, which is, of course, somewhat shortened compared with the period of incubation in ordinary scarlet fever. In all cases the disease was unusually mild and the symptoms in the pharynx were mild. The author believes that the infectious agents were already situated in the mouth and that the operation furnished the inciting cause. An extensive hyperæmia of the pharynx was produced, causing a relaxation of the epithelium and the means of access for the infectious germs, or by the incision micro-organisms were forced into the lymphatic vessels or from the necrotic false membrane which soon covers the gaping lymph- and blood-vessels. Finally a case is reported where, following the removal of the pharyngeal tonsil, articular rheumatism developed.

SUCKSTORFF.

228. URBANTSCHITSCH. *On reflex epilepsy.*

The author reports a case where a radical operation caused

complete recovery from epileptic attacks which had existed for fifteen years. After a certain length of time another attack appeared. The epilepsy was again cured by another operation.

WANNER.

229. HENNEBERT and TRÉTROP. *On the objectively perceived entotic noises.*

In all four cases which affected the right ear the noise was of arterial nature, namely synchronous with the pulse and influenced by compression of the carotid artery. Of interest is the description of one patient who was relieved of tinnitus by the ligation of the right internal carotid. There was at the same time double choked disk and the diagnosis was made of an intracranial aneurism.

BOENNINGHAUS.

230. KUTSCHER. *On examinations of the naso-pharyngeal cavity in healthy man for meningococci.*

Kutscher has observed the diplococcus four times in the discharge from the naso-pharynx of 56 persons who had not themselves suffered from epidemic cerebrospinal meningitis nor had come in contact with those affected with this disease. These could not be distinguished morphologically, culturally, nor by immunizing conditions from the true meningococcus. It therefore seems that healthy persons who have received the true meningococcus from a meningitis patient may continue to carry this organism about with them, and that these persons suffer from a meningococcal pharyngitis but not true meningitis because the necessary disposition is wanting. A description of the very delicate methods which are necessary to show the presence of the meningococcus and its differentiation from similar cocci must be read in the original. NOLTENIUS.

231. KRIEGER. *Pain in the ear and in the mastoid process in hysterical subjects.*

Krieger confirms, with the aid of five additional cases, the view that the disease called mastoid neuralgia by Schwartz is of hysterical nature.

SUCKSTORFF.

232. CELIO. *Reflex cough in teething children. A contribution to the physiology of sleep.*

Children who are teething frequently wake up suddenly

with a cough after having slept soundly for three hours. The cause, according to the author, lies in the abundant production of acid-reacting mucus. This gravitates to the epiglottis and the larynx. He recommends astringent solutions to cleanse the mouth and react on the acid.

WANNER.

C.—METHODS OF EXAMINATION AND TREATMENT.

- 233. HAMMOND. A modification of the incision for exposing the mastoid bone. *Medical Record*, June 2, 1906.
- 234. HUBBY. The clinical value of the blood examinations in otitis media purulenta and its complications. *Laryngoscope*, August, 1906.
- 235. BRYANT. Functional derangement of the ears and upper air-tract in the insane. *Medical Record* August, 25, 1906.
- 236. MORSAK. Examination of the hearing of the healthy and diseased ear by the voice. *A. f. O.*, vol. lxviii., pp. 100-121, pp. 161-208, vol. lxix., pp. 1-26.
- 237. BÁRÁNY. Investigations on rhythmic nystagmus reflexly caused by the vestibular apparatus. *M. f. O.*, 1906, No. 4, p. 193.
- 238. WARNECKE. Simple and vibratory catheterization with a current of carbonic acid gas. *A. f. O.*, vol. lxviii., pp. 227-232.
- 239. HAUG. On the use of novocain in operations on the ear. *A. f. O.* vol. lxix., pp. 27-43.
- 240. RACINE and MUCK. A case of apparently one-sided deafness after injury to the health. *Ärztl. Sachverständigen-Zeitung*, No. 18, 1906.
- 241. THEIMER. New experiences with tonogen. *Österreichische Ärzte-Zeitung*, No. 15, 1906.
- 242. LERMOYEZ. Tinnitus aurium. *La presse oto-laryngologique Belge*, 1906, 7.
- 243. URBANTSCHITSCH. Methodic hearing exercises. *M. f. O.* 1906, No. 3, p. 129.
- 244. RUPRECHT. Alypin and novocain. *M. f. O.*, 1906, No. 6, p. 399.
- 245. KATZ. On local anaesthesia of the upper respiratory organs and of the ear. *Deutsche med. Wochenschr.*, No. 36, 1906.
- 246. LAUB. On the action of certain ketone bases allied to adrenalin in rhinology. *Wiener. med. Wochenschr.*, 1906.
- 247. TOUBERT. Chlorid of calcium to prevent hemorrhage. *Arch. internat. d'otol.*, etc., vol. xxii., No. 1, 1906.
- 248. RUTTIN. A snare for the nose and ear. *M. f. O.*, 1906, No. 6, p. 464.
- 249. BUCHER. Inhalation of sodium phenylpropiolat after Bulling. *M. f. O.*, 1906, No. 5, p. 350.

233. HAMMOND. *A modification of the incision for exposing the mastoid bone.*

The incision is triangular instead of being straight or slightly semicircular, and begins about one half-inch back of the superior post-auricular attachment extending through all the tissues obliquely backward and downward along the hairy margin, to a point just below the middle of the posterior border. From this point it is carried forward and downward to the posterior border of the digastric fossa. (It does not appear to have the advantages of the T incision so widely practised by aural surgeons in New York City.)

CLEMENS.

234. HUBBY. *The clinical value of the blood examinations in otitis media purulenta and its complications.*

The value of the blood examination in suppurative diseases of the ear lies in the leucocyte count, simple and differential. Repeated examinations are necessary to determine the progress of the process. Clinical symptoms must be given greater weight than the mere leucocyte determination. In deep suppurations blood tests are invaluable. The average percentage in six mastoids coming to operation at the Manhattan Eye and Ear Hospital where the percentage count was made did not reach above 80.08 per cent. The lowest was 64 per cent. in an acute case.

CLEMENS.

235. BRYANT. *Functional derangement of the ears and upper air-tract in the insane.*

The observations were undertaken to show what relation there might be between insanity and functional derangement of the ear and upper air-tract. One hundred and sixty-one patients were examined. Among these, 15 had no ear disease, and only 3 had perfectly normal hearing. Although the number of cases observed is not large enough to prove any point conclusively, they nevertheless show that naso-pharyngeal or aural diseases are much more prevalent among the insane than among normal individuals; that sometimes hallucinations of hearing appear to be excited by subjective sensations of hearing, and that aprosectic psychosis is sometimes aggravated, if not excited, by intranasal pressure. The improvement among the 161 cases due to oto-rhinological

treatment was only 3.7 per cent. Out of the selected cases, about 62 per cent. showed marked improvement, and the balance showed some.

CLEMENS.

236. MORSAK. *Examination of the hearing of the healthy and diseased ear by the voice.*

This paper, originating in Bezold's clinic, examines which numbers are heard best in the various diseases of the human ear.

In the introduction is given the examination of normal-hearing soldiers to determine the hearing distance at which certain numbers pronounced in a whisper can be perceived distinctly. This examination took place in a room 89cm long. It was found that whisper can be heard by the normal ear at a very much greater distance than has previously been assumed. The average hearing distance is 58cm, although in some cases the limit extended to 89cm. The number 7 (these numbers are all pronounced in German) was heard best, and the number 100 was heard the poorest. The numbers 7, 4, 8, 2, 6, 3, have the largest hearing distance, the numbers 9, 5, and 100 the shortest. In the tone series the numbers 2, 6, 7, are situated in the upper part, 8 and 3 in the middle, 9 and 100 in the lower, 4 and 5, as well in the upper as in the lower parts. The numbers which can be heard at long distances correspond to those which are situated high up in the tone series or extend partly into the upper part of the tone series, as 3 and 4; and the numbers with shortened hearing distance are those which belong to the lowest segment of the tone series, as 5 or 8. The numbers 4 and 5 occupy a double position.

The examination of diseases of the sound-conducting apparatus gave the following results:

1. In all disturbances in the sound-conducting apparatus the numbers 5, 8, and 9 and partly the number 4 are relatively poorly perceived.
2. Reduced perception of the number 9 points to a disturbance in the equilibrium of the ossicular chain. This number is, therefore, the characteristic number for a tubal process.
3. The number 5 in the same series is the characteristic

number for an acute middle-ear process, and poor hearing of this number indicates accumulation of fluid in the middle ear and the corresponding interference in motility of the ossicular chain.

4. Imperfect hearing of the number 8 is probably a sign of abnormal fixation of the sound-conducting apparatus. It is characteristic for chronic purulent otitis and for sclerosis.

5. In all diseases associated with the disturbance of the sound-conducting apparatus most cases present a hearing distance of below 1 metre.

6. A direct relation between the degree of sound-conducting disturbance and of the size of the hearing defect exists in sclerosis and in chronic purulent otitis. In sclerosis the hearing distance diminishes together with a retraction of the lower tone limit. In chronic purulent otitis the size of the hearing defect increases together with the destruction of the drum and of the ossicles.

7. Only in high-grade retraction of the upper tone limit (Edelmann-Galton from 6), there is a correspondence with the hearing distance.

8. Between the upper and lower tone limits there is no relation.

9. The hearing is most affected in the tubercular otitis.

10. The residua of healed perforations showed better hearing than those with persistent perforation.

11. Lesions and changes of the drum membrane are of less influence on the hearing distance than lesions of the ossicular chain.

The following varieties of disease of the nervous apparatus have been examined: Nervous deafness without apparent cause, after noises, after traumatisms, following noisy occupations, after meningitis, after acquired syphilis, after congenital syphilis, Ménière's symptom complex and congenital deafness.

The results are:

1. In the chronic nervous deafness the numbers 4, 5, 7, especially the last, are heard the worst of all numbers on examination with the whispered voice.

2. The poor hearing for these numbers may be of some pathognomonic importance.

3. Marked hearing defect for the number 9 in chronic

nervous deafness without change in the drum membrane means that the present condition of the inner ear has been preceded by Ménière's symptom complex.

4. Markedly reduced hearing for the number 6 in addition to simultaneously impaired hearing for the number 7 means that the nervous deafness is acquired.

5. The hearing distance in all forms of nervous deafness is usually reduced under 50cm. An exception is the nervous deafness after noises and Ménière's disease.

6. The most marked degree of poor hearing is found in the cases depending upon congenital and acquired syphilis.

7. The upper tone limit in all forms of nervous deafness is contracted to a moderate degree (up to Edelmann-Galton 4); rarely to a more marked contraction (6).

8. The lower tone limit is always normal; in certain cases it is moderately, never markedly, contracted. It is especially involved in congenital syphilis, in Ménière's disease and in congenital deafness.

9. Between the position of the upper tone limit and hearing duration there is no connection unless the contraction is below 6.

10. After Ménière's disease the hearing distance is usually slightly reduced; an improvement on more marked contraction is not excluded.

ZARNIKO.

237. BÁRÁNY. *Investigations on rhythmic nystagmus reflexly caused by the vestibular apparatus.*

This paper of Bárány's is the most exhaustive which has appeared on this subject. There are a large number of new and interesting observations on normal and diseased ears which require to be read in the original. The results which are given at the end of the paper are as follows: on suppressing the nystagmus when the eyes are closed the sensation of apparent rotation of the body is prevented, so that the nystagmus forms a distinct part in the production of the sensation of rotation. The subjective sensations of vertigo are only of restricted value in the examination of the function of the semicircular canal. Vestibular vertigo can only be assumed to be present if definite statements are given that the apparent rotation of the external objects or of the body

itself continues for a long period. There are attacks of vestibular nystagmus when the apparent movements do not appear. The author regards rhythmic nystagmus as the measure of the amount of the irritation of the semicircular canals. It is therefore of great importance because the movements are not influenced by the will. In addition to the examination for the presence or absence of spontaneous nystagmus, it is of importance to examine the causation of the nystagmus, by the various methods of irritation and the observation of its course. The author has added another method, namely, syringing the ear with cold and hot water, to those previously known, which consist in active and passive rotation, galvanization and compression or rarefaction of the air in the auditory canal. These methods of examination have principally given us the result for the diagnosis of one-sided reduction or suppression of the function of the vestibular apparatus, especially in the diagnosis of labyrinth suppurations. The marked reactive movements which result after strong irritation of the vestibular apparatus are, in the author's opinion, only applicable for the diagnosis of the diseases of the vestibular apparatus when there is a correspondence between the degree and direction of the nystagmus and the direction and degree of the disturbance of equilibrium and when changes in the position of the head disturb in a typical manner the equilibrium.

WITTMAACK.

238. WARNECKE. *Simple and vibratory catheterization with a current of carbonic acid gas.*

In this apparatus the carbonic acid gas is led through a rubber tube to the aural catheter. A frequently interrupted current is more active than a continuous one, and the carbonic acid gas seems to be more potent than the other varieties of gases. There seems to be no danger of superpressure in this apparatus.

ZARNIKO.

239. HAUG. *On the use of novocain in operations on the ear.*

The author has used, with apparent success, novocain solutions in a variety of aural operations. In the operations on the auricle and the bones of the mastoid, Braun's second

novocain suprarenin solution was injected subcutaneously. In operations on the drum and the middle ear a watery solution was instilled into the meatus with or without the previous application of a carbolic acid glycerin solution. Sometimes the novocain solution was added directly to the carbolic glycerin solution. Occasionally the conducting anaesthesia was employed by injection in the course of the sensory nerves (*Braun, von Eicken*) to produce complete anaesthesia of the drum. For the pain of an acute otitis the instillation of a novocain carbolic glycerin solution seemed to be the best, and the injection of Braun's solution number 2 through the tube to relieve tinnitus.

ZARNIKO.

240. RACINE and MUCK. *A case of apparently one-sided deafness after injury to the head.*

A very interesting and remarkable case of a school-girl, 12 years of age, who, after receiving a blow on the ear, became deaf; and a physician stated that the hearing power was permanently lost. The successful proof of simulation with Coggie's test saved the teacher from a severe fine. BRUEHL.

241. THEIMER. *New experiences with tonogen.*

The action of tonogen is double; in an operative way as blood saving, and as a diagnostic aid, especially in children when an examination of the naso-pharynx is much facilitated.

WANNER.

242. LERMOYEZ. *Tinnitus aurium.*

Lermoyez treated a man seventy-six years of age for a very annoying subjective tinnitus, who had had previously no trouble with his ears. The noise was probably the result of a spasm of the elevator of the soft palate. The treatment consisted in complete withdrawal of salt from the diet. The tinnitus had existed for eight months and could be compared to the noise of parchment paper. Together with the noise there were small oscillations visible in the posterior palatal arch on the same side. Without local treatment the noise was relieved on the following day after the beginning of the diet without salt and was entirely relieved five days later. As the patient showed signs of arterial sclerosis and there were traces of albumen in the urine, the muscular cramp was

regarded as a symptom of intoxication, and this explains the striking success of the treatment.

BRANDT.

243. URBANTSCHITSCH. *Methodic hearing exercises.*

Urbantschitsch replies to criticisms of his methodic hearing exercises. He again draws attention to the good results which have been obtained by his method in the Vienna Deaf-Mute Institution—of course only in particular selected pupils.

WITTMAACK.

244. RUPRECHT. *Alypin and novocain.*

Report of a comparison between these two anaesthetics and with cocaine. Novocain is decidedly less irritating than alypin, but it is too weak to act as an anaesthetic for the mucous membrane. In conjunction with suprarenin it is an ideal anaesthetic for infiltration anaesthesia. Alypin combined with suprarenin is a substitute for cocaine in its anaesthetic action. Alypin is better than cocaine because there seems to be an idiosyncrasy, its toxicity is less, atonic after bleedings is less pronounced, the solution can be boiled, and it is less expensive. It does not, however, cause the cavernous structures to contract, nor the blood-vessels, and there seems to be a somewhat more marked irritation of the nasal mucosa. Solutions of alypin keep as well as those of cocaine.

WITTMAACK.

245. KATZ. *On local anaesthesia of the upper respiratory organs.*

Katz has given up cocaine on account of its toxicity, and because it cannot be sterilized, and employs alypin and novocain. Alypin, he thinks, is the more powerful anaesthetic, as, for instance, in paracentesis of the drum and incision of a furuncle. If an anaemia of the operative field is desired, a few drops of an adrenalin solution are added to the novocain.

NOLTENIUS.

246. LAUB. *On the action of certain ketone bases allied to adrenalin in rhinology.*

Aminoketon, methyl, and ethylaminoketon were tried in 300 cases. The ethyl combination appears to be the most potent. Four to five per cent. watery solutions are used, to

which are added a few drops of a diluted hydrochloric acid solution and three per cent. boric acid solution.

All three ketones are vascular constrictors; the mucous membrane becomes pale, anaemic, and grayish white. After three to four hours this striking action is still present. The actions were tried not only for diagnostic purposes but also in order to relieve the reflex neurosis caused by the hyperæmia of the nasal mucosa and in headache and in acute catarrhs of the frontal sinuses.

The four to five per cent. solutions of the ketones are about as active as the usual solutions of the adrenalin. For diagnostic purposes, a solution of one to two per cent. is sufficient.

WANNER.

247. TOUBERT. *Chlorid of calcium to prevent hemorrhage.*

Calcium chlorid increases the coagulation of the blood, and is therefore used by the author as a prophylactic against hemorrhage. Before operations on the mastoid process, for the removal of tonsils and adenoid vegetations, a solution is given the patient to drink which contains two to three grams of chlorid of calcium. This is drunk two or three times, the last dose being taken a few hours before operation. When the solution is prescribed no milk must be drunk, because the coagulation of milk would interfere with the action of the calcium chlorid. The author underestimates the value of hydrogen peroxid, and especially of the adrenalin preparation.

OPPIKOFER.

248. RUTTIN. *A snare for the nose and ear.*

The advantage of this new snare is that it can be introduced into the nasal cavity or into the naso-pharynx and then be enlarged to any desired size. At the same time the snare will then assume the curve which has been given to it before the operation. (To be obtained from Erhard, Vienna.)

WITTMAACK.

249. BUCHER. *Inhalation of sodium phenylpropiolat after Bulling.*

A solution of 200 g. was daily inhaled, at first one per cent., after two weeks increasing from two to three per cent. The temperature of the sodium was begun at 30°, gradually rising

to 45° and then finally reducing to 30°. The observations were exclusively made on tuberculous larynxes. It was attempted to make the daily inhalations as long as possible and without interruption. The results were favorable and confirm the previous experience that phenylpropiolat as an inhalation is the equal of any known remedy.

WITTMAACK.

d—DEAFMUTISM.

250. CITELLI. A rare case of deafmutism after purpura hæmorrhagica. *Archivio italiano di otol., etc.*, vol. xvii., 4, 1906.

A child two years of age presented, with moderate fever, the signs of purpura hæmorrhagica and paralysis of the lower extremities, this paralysis being due to an anterior poliomyelitis. The child became totally deaf at the same time. The loss of hearing continued and the child was also mute. According to the author, cases of total deafness after purpura hæmorrhagica are very unusual.

RIMINI.

EXTERNAL EAR

251. DENCHFIELD. Etiology, diagnosis, and treatment of auricular chondritis and perichondritis. *Laryngoscope*, August, 1906.

252. PAWLLOW-SILWANSKI. On serous cysts of the auricle. *Chirurgija*, March, 1906.

253. TAUBERT. Acquired complete occlusion of the external auditory canal. *Deutsch. militär. Zeitschr.*, No. 6, 1906.

254. BJALIK. Two cases of burns of the drum membrane. *Eshemesjatschnik uschnych, gorlowych i nossowych bolesnej*, August, 1906.

255. GUÉRIN. Burning of the drum through hot water. *Annales des mal. de l'oreille*, January, 1906.

256. BELOGOLOWOW. On the use of the egg membrane to heal perforations of the drum. *Eshemesjatschnik uschnych, gorlowych i nossowych bolesnej*, August, 1906.

257. PUTSCHKOWSKI. Trichloracetic acid in dry perforations of the drum. *Wojenno-Medzinski Shurnal*, July, 1906.

258. ZYTOWITSCH. On respiratory and pulsatory movements of the drum. *Russki Wratsch*, 1906, No. 23.

251. DENCHFIELD. Etiology, diagnosis, and treatment of auricular chondritis and perichondritis.

The following treatment is recommended by the writer: Make a small but sufficiently large incision into the lower border of the mass; drain out the contents until the auricle

becomes naturally flat, swab out the entire inner surface with an application of carbolic acid which is pure, immediately following it with a swab of alcohol of the same strength, leave within the opening a small strip of gauze for drainage, and wrap the whole ear in cotton with a gentle even pressure over the formerly swollen part. Healing has taken place quickly and practically without any consequent deformity.

CLEMENS.

252. PAWLOW-SILWANSKI. *On serous cysts of the auricle.*

Two cases, which were operated on and examined, of serous cysts of the auricle. In the first case the lesion was produced by frostbite. Microscopically there were degenerative changes in the cartilage. In the second case there was an othematoma after injury.

SACHER.

253. TAUBERT. *Acquired complete occlusion of the external auditory canal.*

The membranous occlusion of the external canal resulted from secondary inflammation in chronic purulent otitis.

BRUEHL.

254. BJALIK. *Two cases of burns of the drum membrane.*

In the first case the burn was the result of the instillation of oil of cajaput; in the second, from the introduction of several drops of a mixture of benzin and oil of bergamot. In both cases the severe pains were relieved on the application of a heated soda solution.

SACHER.

255. GUERIN. *Burning of the drum through hot water.*

After this burn the drum membrane was completely destroyed, but the otorrhoea finally ceased.

BOENNINGHAUS.

256. BELOGOLOWOW. *On the use of the egg membrane to heal perforations of the drum.*

The report of a successful case.

SACHER.

257. PUTSCHKOWSKI. *Trichloracetic acid in dry perforations of the drum.*

Trichloracetic acid has been employed in 35 cases.

(1) In the case of small and medium-sized perforations the acid gives good results. Large perforations with callous

margins are difficult to heal. The cauterization should not be tried until the inflammatory symptoms have all disappeared and the suppuration has ceased. (2) The fluid should be applied in a 30-35 per cent. solution. One should attempt not to come in contact with the mucous membrane of the tympanum. If inflammatory symptoms appear, the cauterization must be given up. (3) Between the cauterizations there should be an antiseptic irrigation and a dry packing should be introduced. (4) The general condition of the patient must not be neglected.

SACHER.

258. ZYTOWITSCH. On respiratory and pulsatory movements of the drum.

The author found: (1) Every inspiration produces a movement of the drum. (2) The movement inward depends upon the variation in pressure between the naso-pharynx and the middle ear; also it is partly due to aspirations of the respiratory current. (3) The movement outward is caused by compression of the Eustachian tube, by the muscles which elevate the soft palate, and by the forcing out of the air from the tube into the tympanum. (4) Respiratory and pulsatory movements of the drum are measured by the movements of a drop in the manometer. (5) Occasionally the increased pulsation of the drum is the only symptom of a hyperæmia of the ear.

SACHER.

MIDDLE EAR.

a.—ACUTE OTITIS.

259. RUSS. A case of primary acute purulent otitis caused by Friedländer's bacillus. *Wien. med. Wochenschr.*, No. 35, 1906.
260. BAAR. A contribution to the etiology of otitis media acuta suppurativa post morbillos. *Medical Record*, August 18, 1906.
261. WITTMAACK. On the rôle of the streptococcus mucosus in the production of acute otitis media. *Deutsche med. Wochenschr.*, No. 31, 1906.
262. TANTURRI. Anatomic and experimental investigations on the pathogenesis of acute purulent otitis. *Gazetta internazionale di medicina*, ix., 1906.
263. BELOGOLOWOW. The best method of treatment in purulent otitis in soldiers. *Wojenno-Medizinski Shurnal*, July, 1906.
264. KUDINZEY. On early opening of the mastoid process in purulent otitis. *Chirurgija*, March, 1906.

265. LUC. On latent purulent mastoiditis. *La presse otolaryngologique Belge*, 5, 1906.
266. JACQUES. On Gradenigo's symptom. *Ann. des mal. de l'oreille*, etc., June, 1906.
267. BAUROWICZ. Otitic paralysis of the abducent nerve. *M. f. O.*, 1906, No. 8.
268. TERSON. Paralysis of the abducent nerve in the course of acute otitis. *Ann. des mal. de l'oreille*, etc., July, 1906.
269. ALT. Otitic paralysis of the abducent nerve. *M. f. O.*, 1906, No. 2.
270. NEUMANN. Otitic paralysis of the facial nerve. *Wiener med. Wochenschr.*, Nos. 25, 26, 27, 1906.
271. FLEISCHMANN. On the treatment of purulent otitis with Bier's method of congestive hyperæmia. *M. f. O.*, 1906, No. 5.
272. ISEMER. Clinical experience with congestive hyperæmia in the treatment of otitis media. *A. f. O.*, lxix, pp. 131-148.
273. HASSLAUER. Congestive hyperæmia in the treatment of purulent otitis. *Münchn. med. Wochenschr.*, 1906, No. 34.
274. BAR. A case of mastoiditis without otorrhœa. *Ann. des mal. de l'oreille*, etc., May, 1906.
275. GUISEZ. Osteomyelitis of the flat bones of the skull in the course of purulent otitis and frontal sinusitis. *Ann. des mal. de l'oreille*, etc., June, 1906.

259. RUSS. A case of primary acute purulent otitis, caused by Friedländer's bacillus.

Two months before the onset of a subperiosteal abscess the patient experienced tinnitus and loss of hearing. Seven weeks before there was discharge from the ear, which lasted for two days. There never was any pain.

Bacteriological examination of the pus from the subperiosteal abscess revealed Friedländer's bacillus in pure culture. In the blood serum of the patient during the course of the disease, agglutinins appeared which could be demonstrated by the presence of a typical reaction. WANNER.

260. BAAR. A contribution to the etiology of otitis media acuta suppurativa post morbillos.

The history of five children in the same family, who were attacked with measles, is reported. In all of them appeared an acute otitis media. In three of the children the mastoid process, the antrum, and the cranial cavity had to be opened on account of alarming cerebral symptoms which appeared in spite of the previous most painstaking antiphlogistic and antiseptic treatment, poultices, and drainage after careful

irrigations of the external auditory canal with warm solution of borax or instillations with peroxide of hydrogen and drying. The appearance of this purulent inflammation of the middle ear at the end of the second week of illness, seems to speak very much against the universal view, according to which the measles otitides are caused by the primary exanthem. The fact that in the pus taken from the depth of the exterior auditory meatus as well as in the pus taken under aseptic precautions during the operation from the antrum, mastoid process, and extradural abscess, was found the same coccus—a staphylococcus—shows the latter to be the cause of the disease.

CLEMENS.

261. WITTMAACK. *On the rôle of the streptococcus mucosus in the production of acute otitis media.*

Wittmaack has examined the discharge bacteriologically obtained from a large number of cases of severe acute otitis with mastoiditis, and has used the blood agar media of Schottmueller and lackmus-nutrose agar. In addition to the already well-known pyogenic organisms, he found the streptococcus of erysipelas-Schottmueller and the diplococcus lanceolatus. The streptococcus mucosus occupied the third place in the production of acute otitis. Staphylococci were only found when the discharge had been present for several days. It therefore seems reasonable to say that the staphylococci are due to a secondary infection, while the green streptococcus described by Schottmueller apparently is not of any particular importance in the severe forms of acute otitis. To differentiate the three above mentioned varieties of cocci, Wittmaack employed staining methods with thionin. If the cocci were usually in pairs, with the characteristic lance shape and partly intracellular, and, upon staining with carbolfuchsin, presented distinct capsules, which capsules did not appear with thionin staining, they were with great probability the diplococcus lanceolatus. If there were distinct red-colored capsules after staining with thionin, the organism was probably the mucosus. When all capsule formation was absent and the cocci were arranged in chains, probably the streptococcus of erysipelas was present. The author, moreover, formed the belief that the otitis mucosus runs a protracted course rela-

tively, often complicated with mastoiditis. He believes that in many cases a primary disease of the mucous membrane in the pneumatic cells is present, while the involvement of the bone and the mastoid process is to be regarded as a secondary process.

NOLTENIUS.

262. TANTURRI. *Anatomic and experimental investigations on the pathogenesis of acute purulent otitis.*

After a number of anatomic and histologic points on the middle ear, the author discusses the bacteriological condition of the Eustachian tube and the middle ear in health. Moreover the various causes which lead to occlusion of the Eustachian tube are mentioned, which, in the opinion of the author, is an important factor in the causation of acute purulent otitis.

In confirmation of this, the author experimented with rabbits, with the following result:

The experimental transformation of the open cavity of the middle ear into a closed cavity always causes an acute purulent otitis.

RIMINI.

263. BELOGOLOWOW. *The best method of treatment in purulent otitis in soldiers.*

After careful drying of the canal and the drum, the latter receives an application of a heated one per cent. silver-nitrate solution. A small cotton tampon is then introduced to the drum in the form of a thin layer. This is supposed to immobilize the drum. The canal is then filled with small pledgets of cotton and the dressing is changed daily. The results are supposed to be very good.

SACHER.

264. KUDINZEWS. *On early opening of the mastoid process in purulent otitis.*

The author advocates early operation, even when no distinct signs of mastoiditis are present and there is only a suspicion of mastoiditis. Of diagnostic importance is the dulness on percussion of the mastoid process.

SACHER.

265. Luc. *On latent purulent mastoiditis.*

If a person suffers from bilateral purulent otitis with so much discharge that an involvement of the mastoid process is suspected, signs of retention of pus in one ear should mean

that both antra are to be opened at one sitting. We thus prevent a second retention of pus, which would necessitate a second narcosis, and we thus abbreviate the suppuration in both ears. The treatment is thereby also simplified. Two cases are reported which have been treated in this manner.

BRANDT.

266. JACQUES. *On Gradenigo's symptom.*

Of the cases of paralysis of the abducent nerve in the course of an otitis media, in 19 this symptom appeared in the otherwise normal course of the otitis and was spontaneously recovered from. In three it was the initial symptom of fatal meningitis. The author publishes a fourth case of this kind, which was also remarkable inasmuch as one day a large quantity of cerebrospinal fluid was evacuated from the ear. The somewhat retarded operation did not demonstrate the path by which the fluid was discharged. No autopsy.

BOENNINGHAUS.

267. BAUROWICZ. *Otitic paralysis of the abducent nerve.*

An acute perforative otitis media which ran a brief course but was complicated with paralysis of the sixth and seventh nerves, which was also rapidly recovered from.

WITTMACK

268. TERSON. *Paralysis of the abducent nerve in the course of acute otitis.*

In both cases abducent paralysis occurred in children as the only complicating symptom of an acute purulent otitis. This paralysis was recovered from several months after the otitis had healed. It is interesting to observe that the authors in the course of their study have come to a plausible explanation of this fact. According to them, it is due to the progression of the inflammation from the tympanum along the venous plexus surrounding the carotid canal, which enters into the cavernous sinus and there comes in close proximity with the abducent nerve. It is impossible to say whether there is an inflammatory affection of these nerves or of the lymph space or of a sympathetic nerve. This hypothesis gains ground because in one of these cases, 15 months before, a transient facial paralysis occurred on the same side after

an acute purulent otitis. In facial paralysis there is a direct extension of the inflammation of the tympanum to the nerve.

BOENNINGHAUS.

269. ALT. *Otitic paralysis of the abducent nerve.*

Alt has studied the various cases of otitic paralysis of the abducent nerve reported in literature. He found that the most frequent cause for the production of this paralysis was a meningitis situated at the apex of the petrous pyramid. Another cause was pressure from a serous meningitis in extradural abscesses. The progression of the inflammation in the venous sinus of the carotid canal to the cavernous sinus and to the abducent nerve is very probable, while thus far no proof has been furnished for the exemption of an infectious neuritis of this nerve.

WITTMAACK.

270. NEUMANN. *Otitic paralysis of the facial nerve.*

The author reports on a case of facial paralysis after the administration of iodin, and believes it to have been caused by inflammatory hyperæmia and serous imbibition of the neurilemma and of the endosteal lining of the facial canal.

The author gives a valuable point to avoid operative injury to the facial nerve. This is the occurrence of arterial bleeding during the removal of the facial ridge, which is supposed to be derived from a branch situated near the canal.

Finally the indications for the anastomoses of the facial, according to Alexander, and the operative technique are given. The symptoms and the literature, as well as the pathological changes, complete this very readable paper.

WANNER.

271. FLEISCHMANN. *On the treatment of purulent otitis with Bier's method of congestive hyperæmia.*

Twenty-four patients were treated with congestive hyperæmia. Of these there were nine purulent otides without complications, twelve with mastoiditis, two of chronic purulent otitis with acute mastoiditis, two of perichondritis.

The results were not very favorable. During this delay the process in the mastoid frequently extends to the dura or to the sinus. This in itself is a grave objection to the new method, and the danger is apt to be present that we overlook

the timely moment for the operation. The congestive hyperæmia removes the acute symptoms from the picture of the disease and converts the manifest into a latent variety. It is surely true that not all cases of mastoiditis will be cured by congestive hyperæmia and, as long as we do not know which are particularly applicable to this method and how long we may wait with the operation, we must be content that in addition to good results there will also be some unsatisfactory terminations.

WITTMAACK.

272. ISEMER. *Clinical experience with congestive hyperæmia in the treatment of otitis media.*

Based on 12 cases of purulent otitis (11 acute, 1 chronic; 9 with mastoiditis) which were treated at the Halle Clinic, with congestive hyperæmia, the author comes to practically the same conclusions as Fleischmann, which are most unfavorable to the method:

1. The treatment of otitis media with congestive hyperæmia is not without danger because we are liable to overlook the timely operation and thus increase the danger of the disease.
2. It cannot as yet be established in which cases and in what stage congestive hyperæmia is applicable, nor how long it is to be continued before operative treatment should be tried.
3. Especially dangerous is the protracted use of congestive hyperæmia in the otitis due to diplococci.
4. Congestive hyperæmia should of course not be tried in the presence of any intracranial complication. ZARNIKO.

273. HASSLAUER. *Congestive hyperæmia in the treatment of purulent otitis.*

Hasslauer has treated fourteen cases of chronic otitis and twenty-three cases of acute otitis with Bier's method. In the chronic cases, with the exception of one, no favorable influence could be observed, while the ordinary treatment resulted in recovery.

Of the twenty-three cases of acute otitis, sixteen were without perforation; of these seven apparently got well from congestive hyperæmia, in the other nine paracentesis had been performed. Three of the latter had to be operated

upon later. The other seven cases came to treatment with an already existing perforation. Of these, three recovered without, and four with, opening of the mastoid process. In some of the cases operated upon the suction treatment of Stenger was applied.

It was noticeable that in the treatment with congestive hyperæmia external otitis frequently appeared.

The author is very well satisfied with the results obtained, and thinks that congestion is a distinct advance in the treatment of suppurative ears. It is well known that most authors are of the opposite opinion. The reviewer cannot regard Hasslauer's results as particularly favorable, because in 30 per cent. of the cases he had to operate, while Hummel and Mueller, who did not use this treatment, had to operate in only 14 and 7 per cent. respectively.

SCHEIBE.

274. BAR. *A case of mastoiditis without otorrhœa.*

Two years after an acute otitis media which had recovered in four weeks with closure of the drum and restitution of the ear, a subperiosteal abscess developed over the mastoid process on the same side. The mastoid process contained granulations and pus. It was remarkable that the drum was normal and that paracentesis did not evacuate any discharge, and that the hearing since the onset of the mastoiditis had become very much reduced and later was regained.

BOENNINGHAUS.

275. GUISEZ. *Osteomyelitis of the flat bones of the skull in the course of purulent otitis and frontal sinusitis.*

A clinical study of this infrequent condition which has only in recent times had attention paid to it. The clinical picture is as follows: in the course of a frontal sinusitis or a purulent otitis, usually after an operation, rarely spontaneously, a swelling and redness of the forehead, of the temple or of the occiput appear with pain and pyæmic fever. At operation a subperiosteal abscess is found. The bone is red, softened, and infiltrated with pus. The process may now cease or go on to death. A clinical example of this course is the case of Claoué, which is reviewed below.

BOENNINGHAUS.

b.—CHRONIC PURULENT OTITIS.

276. IWANOW. *Ectogan in chronic otorrhœa.* *Eshemesjatschnik uschnych, gorlowych i nossowych bolesnej*, September, 1906.
277. CHRISTENSEN. *On caries of the hammer and of the incus, based on fifty radical operations.* *Ugeskrift for Læger*, 1906, Nos. 25, 26.
278. HAAG. *Otitis media with cholesteatoma.* *Korrespondenzblatt f. Schweizer Ärzte*, No. 19, 1906.
279. STELLA. *Cholesteatoma of the ear.* *Allgemeine Wiener med. Zeitung*, Nos. 13, 14, 15, 1906.
280. VIDAL. *On the pain during after-treatment with boric acid insufflations in radical operations.* *Annales des mal de l'oreille*, January, 1906.
281. LAURENS. *Combined method of after-treatment in the radical operation.* *Annales des mal. de l'oreille*, etc., March, 1906.
282. KRETSCHMANN. *Salivary fistulæ after mastoid operations.* *Arch. f. Laryngol.*, lxviii., pp. 257-262.
283. URBANTSCHITSCH. *On the pathology and physiology of the labyrinth.* *M. f. O.*, 1906, No. 2, p. 1.

276. IWANOW. *Ectogan in chronic otorrhœa.*

The author has used ectogan in chronic suppurations with large or complete destruction of the drum. The powder is insufflated every two or three days. The suppuration usually has ceased after 2-4 weeks.

SACHER.

277. CHRISTENSEN. *On caries of the hammer and of the incus, based on fifty radical operations.*

Two cases are excluded, one on account of a previously undertaken operation, one on account of the presence of a carcinoma. The hammer and anvil were both present in 26 cases, the hammer alone in 8, the incus in 6; both were absent in 8.

The malleus was healthy in 13 cases, carious in 21, absent in 14. The incus was healthy in 4 cases, carious in 28, absent in 16.

The carious process was situated in the hammer: in the region of the manubrium 11 times, at the neck twice, at the head 13 times, on the articular surface only twice. The incus was affected: in the long branch, 22 times, in the short branch 12 times, the body 10 times. The bone was almost completely absent in 3 cases—the articular surface was usually not involved, only when there was marked caries or when the other bones were absent.

Generally the bony parts which are protected by connective tissue are affected the least. The caries, presumably, is secondary to the periostitis. The duration of the suppuration and the extent of the caries do not stand in any relation, though retarded discharge of pus or cholesteatomata produce marked caries.

As regards the otoscopic picture, perforation of Schrapnel's membrane usually denotes caries of the head of the hammer. If this membrane is intact, the head of the hammer is not involved. There is no correspondence between the caries of the incus and the situation of the perforation.

JOERGEN MOELLER.

278. HAAG. *Otitis media with cholesteatoma.*

This article is destined for the general practitioner. In discussing the radical operation the author recommends preservation of the ossicular chain when hearing remnants are present. Siebenmann's plastic furnishes excellent results, and if cleanly performed never leads to perichondritis.

OPPIKOFER.

279. STELLA. *Cholesteatoma of the ear.*

The author distinguishes between false cholesteatoma resulting from epithelial proliferation of the external auditory canal and primary true cholesteatoma, which is a true endothelioma. The former is very frequent, the latter very unusual. A number of theories for the production of false cholesteatoma are adduced, but the one of Habermann-Bezold is not mentioned. The view of the author that every cholesteatoma associated with purulent otitis should be radically operated upon, is not the reviewer's opinion. The after-treatment of the radical operations is carried out with boric acid insufflations, according to Eemann. On the whole, the paper does not bring anything new.

WANNER.

280. VIDAL. *On the pain during after-treatment with boric acid insufflations in radical operations.*

This otherwise excellent and simple method of Eemann's has become discredited because the boric acid in the beginning may cause severe pain. Vidal found that this originates from the tube and that it can be prevented if a drop of

glycerine is instilled in the tubal angle before the boric acid is introduced.

BOENNINGHAUS.

281. LAURENS. *Combined method of after-treatment in the radical operation.*

Gauze packings become irritating after a time. Therefore, after two weeks, daily introduction of boric acid. Very rapid epidermization, the longest period of healing six weeks. Cauterization of the granulations infrequent. The wound can be well overlooked by (1) resection of the posterior canal wall to the margin of the concha; (2) leaving the wound open until it closes itself by granulation.

BOENNINGHAUS.

282. KRETSCHMANN. *Salivary fistulæ after mastoid operations.*

This includes two observations. In a retroauricular scar a thin fistula appeared. In one case this appeared in the course of the healing, in the other case it occurred many years after healing following a slight traumatism. The fistula discharged watery thin fluid which was increased in amount during mastication. The external fistulous opening was situated at the apex of the mastoid process. The fistulous tract passed inward and upward.

The author thinks it is very likely that these are cases of parotid fistulæ. In addition to these there may be the very unusually observed lymphatic fistulæ, though anatomical considerations favor the first. A chemical analysis of the discharge could not be made. It would seem to the reviewer that after a dose of pilocarpine the differential diagnosis would have been easy. If it was a case of a parotid fistula, the discharge would have been very much increased; otherwise there would have been no increase. The fistulæ were healed by repeated cauterization with silver nitrate.

ZARNIKO.

283. URBANTSCHITSCH. *On the pathology and physiology of the labyrinth.*

This is the report of a cochlear sequestrum, which induces the author to make some observations on the hearing after the

loss of the cochlea, on the subjective auditory impressions, the relation of the facial nerve and hyperæsthesia for thermic irritation on the affected side which was present in these cases.

WITTMAACK.

C.—CEREBRAL COMPLICATIONS.

284. KRÖNLEIN. Demonstration of a case of brain abscess successfully operated upon. *Korrespondenzblatt f. Schweizer Ärzte*, No. 19, 1906.
285. JACKSON. Dual acute cerebral abscess. Operation. Recovery. *N. Y. Med. Jour.*, June 23, 1906.
286. LAGOUTTE. Abscess of the brain of otitic origin. *Lyon médical*, No. 26, 1906.
287. NIELSEN. Otitic abscess of the brain. Operation. *Ugeskrift for Læger*, 1906, No. 23.
288. FOTIADE. Labyrinthine suppuration after cholesteatoma. Otitic abscess of the cerebellar peduncle. *Ann. des mal. de l'oreille*, etc., February, 1906.
289. WAGENER. On the empyema of the saccus endolymphaticus and the importance of the aqueductus vestibuli for the extension of infection. *A. f. O.*, lxviii., pp. 273-285.
290. POLI. A case of otitic intracranial complication after trauma. *Archivio Italiano di Otologia*, etc., vol. xvii., 4, 1906.
291. HÜTTIG. Cases of endocranial complications of suppurative otitis. *A. f. O.*, lxviii., pp. 233-251.
292. PANSE. A case of cerebellar abscess. *M. f. O.*, 1906, No. 8, p. 539.
293. FURET. Pneumococci by meningitis of otitic origin. *Ann. des mal. de l'oreille*, etc., July, 1906.
294. BARDIER and MERIEL. Mastoiditis and thrombo-phlebitis and jugular thrombosis. *Ann. des mal. de l'oreille*, etc., February, 1906.
295. ARCHIPOW. Thrombosis of the lateral sinus and of the jugular vein, with ligation of the latter. *Eshemesjatschnik uschnych, gorlowych i nossowych bolesnej*, September, 1906.
284. KRÖNLEIN. Demonstration of a case of brain abscess successfully operated upon.

Krönlein demonstrated a man forty-five years of age who had suffered from an otitic diplococcus abscess in the left temporal lobe. The operation was followed by recovery.

OPPIKOFER.

285. JACKSON. Dual acute cerebral abscess. Operation. Recovery.

Patient, aged thirty-three, had left middle-ear suppuration of ten days' duration, following earache, subsequent to a blow

on the side of the head. The usual symptoms being present, a mastoidectomy was performed and pus was found in scattered locations; the tip cells being normal. No softened bone was found in the location of the dura, yet there was some in both tegmina. Convalescence appeared to go on normally until the ninth day, when the case had convulsions and became unconscious. Examination of the eye grounds was made and found normal. Marked optic aphasia developed. Unmistakable dulness on percussion was observed over the left side; the pulse was slow in proportion to the temperature, and continuous pain was located in the frontal region. At the second operation, the opening was made in the parieto-temporal region, and forward, downward, and inward for about 2cm an unencapsulated abscess was located, from which four drachms of pus escaped. After a temporary improvement, symptoms occurred demanding further cerebral investigation; and at the third operation, failing to find any communicating pus pocket, the search was pushed downward in a direction paralleled with the temporal gyri, where pus was found and evacuated. Pus from the mastoid showed diplococci in pure culture, while in that from the cerebral abscesses were streptococci.

The use of potassium iodide and biniod. of mercury was found of value in post-operative treatment, especially upon signs of recurrence of cerebral trouble. Cigarette drainage was more satisfactory than any other form heretofore used. Irrigation of the abscess cavities was not used, and the custom is deprecated by the author.

CLEMENS.

286. LAGOUTTE. *Abscess of the brain of otitic origin.*

A left-sided chronic otorrhœa was followed, in a man nineteen years of age, with tenderness over the squama, fever, somnolence, and disturbance of speech. After operating upon the mastoid process, apparent healing; then the patient became worse two weeks later. The middle cranial fossa was exposed and an abscess in the temporal lobe evacuated. Recovery.

OPPIKOFER.

287. NIELSEN. *Otitic abscess of the brain.*

A boy, eleven years of age, with bilateral chronic otitis. Severe brain symptoms for two months. Fetid otorrhœa on

the left side. At the radical operation a fistula leading into the interior of the skull was found. No improvement; retinitis and paresis of the abducent nerve; then opening of the skull. The brain tissue was somewhat discolored, but there was no abscess. Transient improvement followed by severe brain symptoms and copious discharge of cerebro-spinal fluid. Death after ten days. Autopsy: the left temporal lobe is a soft mass infiltrated with pus; the ventricle is dilated into the prolapse. The other parts of the brain are normal.

JOERGEN MOELLER.

288. FOTIADÉ. *Labyrinthine suppuration after cholesteatoma. Otitic abscess of the cerebellar peduncle.*

The first case is unusual because the labyrinth, which was unquestionably diseased (Ménière, facial paralysis) was left untouched at the operation. Later, when the acute symptoms of the labyrinth disturbance had disappeared, a large granulation on the promontory was curetted and recovery took place. In the second case an abscess in the cerebellar peduncle after chronic otitis led to meningitis and death two and a half months after the beginning of the initial symptoms, and two weeks after the beginning of the manifest symptoms. The abscess was not exposed at operation.

BOENNINGHAUS.

289. WAGENER. *On the empyema of the saccus endolymphaticus, and the importance of the aqueductus vestibuli for the extension of infection.*

The author observed a case where an abscess at the posterior surface of the petrous pyramid resembled a ruptured empyema of the sac. The microscopic examination picture showed that this was a simple extradural abscess situated inside of the infected saccus endolymphaticus. Thirty-one cases of this kind, reported in literature, are then critically reviewed. The author believes that the development of an empyema of the sac and the importance of the aqueduct of the vestibule as an infectious path are entirely undetermined. Though it cannot be said that a suppuration in the labyrinth cannot extend along the aqueduct of the vestibule to the sac, the anatomic relations do not appear favorable. Careful microscopic examination alone will lead to a solution of this question. ZARNIKO.

290. POLI. *A case of otitic intracranial complication after trauma.*

A patient, sixty-four years of age, suffering from a left-sided chronic purulent otitis, received a blow over the left temple which was followed by severe headache and a diffuse swelling of that half of the head. Marked fever and chills; left-sided facial paralysis. Shortly after the operation, death.

At autopsy, left-sided chronic purulent otitis media, abscess of the left cerebellar hemisphere, purulent leptomeningitis of the convexity and of the base of the brain.

This case is of especial interest from a judiciary standpoint, as it is of importance to determine whether, in the case of a person suffering from a suppuration, an injury to the head facilitates an endocranial complication, or, if this complication be present, its course be made more rapid by the injury. The question is answered in a positive sense. RIMINI.

291. HÜTTIG. *Cases of endocranial complications of suppurative otitis.*

1. Acute purulent otitis and mastoiditis, left sinus thrombosis, sinus operation with ligation of the jugular vein on the left side, acute purulent otitis with mastoiditis on the right side, mastoid operation on the right side, followed by recovery. Striking was the following condition in this case: During the first change of dressing, two days after the operation on the left sinus, the patient aspirated air four times through the jugular wound with a loud noise. Syncope of short duration. Recovery.

2. Chronic purulent otitis (cholesteatoma), multiple abscesses of the temporal lobe, evacuation of a large abscess, progressive purulent infiltration of the brain. Death.

3. Chronic purulent otitis on the right side (cholesteatoma), sinus thrombosis, leptomeningitis with intrameningeal accumulations of pus in the posterior cranial fossa. Operation. Death.

4. Acute purulent otitis on the right side. Mastoiditis. Cerebral abscess. Operation. Recovery. ZARNIKO.

292. PANSE. *A case of cerebellar abscess.*

The abscess was caused neither by sinus thrombosis nor by labyrinth suppuration. There was no fever. The only

symptoms were slow pulse, optic neuritis—possibly from the meningitis—vomiting, constipation, vertigo with nystagmus and staggering of gait. Preserved hearing and without tinnitus. The nystagmus was noted, especially on looking to the affected side. Favorable course. Recovery.

WITTMACK.

293. FURET. *Pneumococcic meningitis of otitic origin.*

In a case of acute otitis of unknown origin, three weeks later death ensued in 36 hours from meningitis. Paracentesis had been done two weeks before and there was absolutely no obstruction to the escape of the discharge. In the lumbar fluid pneumococci were present. BOENNINGHAUS.

294. BARDIER and MÉRIEL. *Mastoiditis and thrombo-phlebitis and jugular thrombosis.*

The sinus was exposed but not incised, notwithstanding classical pyæmic symptoms. It appeared blue, soft, and pulsating. The autopsy revealed a parietal circular thrombus extending from the torcular to the hyoid bone. It was 3-4mm thick and presented a central lumen.

BOENNINGHAUS.

295. ARCHIPOW. *Thrombosis of the lateral sinus and of the jugular vein, with ligation of the latter.*

Complete description of seven cases which had been operated upon: in three there was recovery; in four, death.

SACHER.

d.—OTHER EAR DISEASES.

296. BRYANT. *The great psychical importance of ear disease.* *Jour. Nervous and Mental Disease*, September, 1906.

297. FIEDLER. *On the so-called blue drum membrane.* *M. f. O.*, 1906, No. 2, p. 106.

298. SCHILLING. *A case of stapes ankylosis with anatomic examination.* *A. f. O.*, lxviii., pp. 209-222.

299. HAMMERSCHLAG. *On the question of the inheritance of otosclerosis.* *M. f. O.*, 1906, No. 6, p. 443.

296. BRYANT. *The great psychical importance of ear disease.*

The cases reported are interesting because of their evident

dependence on catarrhal condition of the ears, as shown by the cessation of the hallucinations when the aural conditions were corrected. The evidence points to some connection between ear disease and hallucinations of hearing other than mere coincidence. It is possible that hallucinations of hearing originate in subjective ear sensations in most cases, and that cure of the coincident ear disease cures or assists the convalescence from psychoses in a notable number of cases. Some cases of insanity appear to be excited by ear disease; and the convalescence of insane patients is delayed by the presence of ear disease. Unilateral hallucinations of hearing are unquestionably due to unilateral ear disease.

CLEMENS.

297. FIEDLER. *On the so-called blue drum membrane.*

In two cases the bluish discoloration of the drum was produced by an exudate situated in the tympanum. In the second case the exudate became infected, the drum perforated, and the exudate was discharged, whereupon the bluish discoloration disappeared.

WITTMAACK.

298. SCHILLING. *A case of stapes ankylosis with anatomic examination.*

A female patient, thirty-seven years of age. Left-sided stapes ankylosis. Right purulent otitis. Radical operation. Meningitis. Death. The autopsy showed that the suppuration gained access to the labyrinth through the round window, and then to the interior of the skull. Microscopic examination of both ears. The areas of rarefaction were shown in the sclerosed ears. Clinical remarks.

ZARNIKO.

299. HAMMERSCHLAG. *On the question of the inheritance of otosclerosis.*

Report of two family trees of patients suffering from otosclerosis, which clearly shows the appearance of this disease in certain families. Thereupon the author advances a number of critical and theoretical observations on the nature of this trouble and upon what the inheritance depends.

WITTMAACK.

NERVOUS APPARATUS.

300. STEIN. *On sudden disturbances in the auditory nerves.* *M. f. O.*, 1906, No. 1.
301. ALEXANDER. *Labyrinthitis chronica ossificans.* *M. f. O.*, 1906, No. 7.
302. ALEXANDER. *On progressive deafness from atrophy of Corti's organ.* *A. f. O.*, pp. 95-105, 1 table.
303. SELIGMANN. *Progressive nervous deafness and Edinger's theory on the consumptive diseases of the nervous system.* *M. f. O.*, No. 2, p. 109, 1906.
304. URBANTSCHITSCH. *Ménière's symptom-complex after mumps in hereditary deafmutism.* *Wien. med. Wochenschr.*, No. 26, 1906.
305. MOLL. *Hysterical deafness.* *Allgemeine Wien. med. Zeitung*, Nos. 32 and 33, 1906.
306. ESKAT. *Arterial sclerosis of the labyrinth and of the auditory centres.* *Ann. des mal. de l'oreille*, etc., April, 1906.
307. LANNOIS. *Combined syphilitic paralysis of the facial and auditory nerves.* *Ann. des mal. de l'oreille*, etc., September, 1906.
308. ALT. *On deafness for melodies and musical false hearing.* Leipzig and Wien: Franz Deuticke, 1906.

300. STEIN. *On sudden disturbances in the auditory nerves.*

The author endeavors to explain the sudden onset of hearing disturbances in the nervous apparatus by the associated arterial sclerosis. Six cases are added, in which disturbances of hearing and subjective auditory perceptions are symptoms of a latent arterial sclerosis which became manifest in excitement or from injury. The disturbances are supposed to be the result of a diminution of the elasticity of the vascular walls after a prolonged vascular spasm.

WITTMAACK.

301. ALEXANDER. *Labyrinthitis chronica ossificans.*

Under this name Alexander describes a pathological condition which he found in a case of acquired deafness. There were circumscribed thickening and ossification of the vestibular membrane and in the papilla basilaris. In addition there was marked atrophy of all the branches of the auditory nerve, with complete degeneration of all the nerve terminals in the labyrinth. Contraction of the entrance of the scala vestibuli into the vestibule. Formation of coagulum in the peri- and endo-lymphatic spaces. Septa and connective-tissue bridges in the vestibule, especially in the basal portion of the tympanic

scala, and atrophy of the stria vascularis. Anatomically this is a disease of the internal ear, which can be best described as a chronic non-purulent inflammation producing bone in the labyrinth similar to ossification after chronic periostitis in other parts of the body. The etiology was not very clear. There was no exact examination made of the ears during life.

WITTMAACK.

302. ALEXANDER. *On progressive deafness from atrophy of Corti's organ.*

This patient, sixty-three years of age, died from a nervous lesion, possibly due to syphilis (clinical diagnosis: myelitic and encephalitic foci. At autopsy: chronic internal hydrocephalus; chronic oedema of the brain; clouding of the ependyma of the fourth ventricle). Moreover, there was left-sided deafness depending upon disease of the sound-perceiving apparatus. Moderate tubal catarrh.

Microscopic examination. Right: 1. Degenerative atrophy of Corti's organ. 2. Atrophy of the stria vascularis. 3. Degeneration of the spiral ligament. 4. Anæmia of the cochlea. 5. Arterial sclerosis of the cochlear vessels. 6. Increased pigmentation of the cochlea. The upper part is unchanged. Left: 1. Complete defect of the papilla basilaris. 2. Marked atrophy of the spiral ligament and of the spiral cord. 3. Parietal connective-tissue formation in the scalæ. 4. Moderate atrophy of the cochlear nerve and of the spiral ganglion. The upper part normal.

This case is the first one in which an atrophy of Corti's organ without other changes has been demonstrated. It is not possible to say how much arterial sclerosis or syphilis were causative factors.

ZARNIKO.

303. SELIGMANN. *Progressive nervous deafness and Edinger's theory on the consumptive diseases of the nervous system.*

Seligmann is of the opinion that progressing, increasing disease of the auditory nerve is due to a consumption of the nerves, in the sense of Edinger. He believes that by the prevention of auditory impressions by closing the ear with cotton, the use of antiphones and the non-use of hearing tubes may be recommended in treatment.

WITTMAACK.

304. URBANTSCHITSCH. *Ménière's symptom-complex after mumps in hereditary deaf-mutism.*

A child, twelve years of age, whose parents and brother were deaf-mutes, suffered from earliest childhood from continuous tinnitus and vertigo for two years, and after an attack of mumps suffered from Ménière's symptoms two weeks later. The attacks, lasting about 10-15 minutes, occurred at first three or four times a month, later, twice a week. The child also demonstrated retinitis pigmentosa, nystagmus, and ataxic disturbances of the lower extremities. An islet of hearing which had been present before the mumps later was lost. On the right side all tones are perceived.

Treatment consisted in the constant current 15-30 minutes long with the ear electrode placed in the drum. Half of the time the direction of the current was reversed. The author believes that he has obtained good results. Recently the perception for low tones in the left ear has improved.

WANNER.

305. MOLL. *Hysterical deafness.*

Report of a case where the first examination showed deafness of one ear. Suggestive treatment caused an improvement in the hearing for whisper from 1-4m. The case is regarded as one of hysteria.

WANNER.

306. ESKAT. *Arterial sclerosis of the labyrinth and of the auditory centres.*

This is an excellent clinical paper which cannot be briefly reviewed. Arterial sclerosis of the labyrinth is to be suspected if anybody beyond the forties gradually or suddenly becomes affected with nervous deafness with or without symptoms of vertigo; if middle-ear sclerosis can be excluded, and there is no sign of syphilis, tabes, progressive paralysis and nephritis; but arterial sclerosis is present in the heart and in the vessels. The paper shows knowledge of the subject, especially as concerns the acoustic and static functions of the brain, which is unusual for an otologist, though it is explained by the fact that the author was an assistant of Charcot's at the Salpêtrière. His experiences with large doses of quinine date from that same period. This drug Charcot was in the habit of employing in Ménière's disease. The description becomes

dramatic when the unfortunate condition is pictured to which the patients attain from treatment, and which frequently results in complete bilateral deafness. BOENNINGHAUS.

307. LANNOIS. *Combined syphilitic paralysis of the facial and auditory nerves.*

Isolated paralysis of the facial nerve or of the auditory nerve in syphilis is not unusual, the combined paralysis is surely very unusual. To the previously known cases Lannois adds four personally observed cases. The combined affection, as well as the isolated one, occurs frequently as an early symptom in the secondary stage of syphilis, rarely in the tertiary. The paralyses developed rapidly together, or one after another. Facial paralysis disappears on treatment, the auditory nerve paralysis cannot be cured. The seat of the combined affections is the internal auditory canal. In the early stage there is a neuritis, in the last stage, a gumma or an exostosis.

BOENNINGHAUS.

308. ALT. *On deafness for melodies and musical false hearing.*

In deafness for tones, or as Alt calls it, for melodies, the simultaneously existing word-deafness has not been sufficiently taken into regard in former observations. Alt therefore demands that the aural examination should in future determine whether a peripheric ear disease is not accountable for the lack of understanding for words and melodies, especially if tone defects in the family exist between b¹ and g². Deafness for melody, according to Alt, depends upon various brain diseases (areas of softening, defects, neuroglioma, etc.). The most marked disturbance of understanding for melodies is the congenital melody deafness. In most cases which have been properly examined there was deafness to a varying degree. Alt believes that the patient who is word deaf in the presence of sensory or subcortical-sensory aphasia, can under no circumstances acquire an understanding for words from the ear. If in complete deafness from disease of the ear, word perception is lost, perception for tones and noises is also completely or nearly completely lost; while in sensory or subcortical-sensory aphasia usually good perception for tones and noises exists in addition to word deafness.

In order to arrive at a better understanding of musical false hearing, regarding which the author has collected a large literature, a number of experiments have been made. Moderate depression of the drum and of the ossicles and a variation in labyrinth pressure cause a change in the tone perception. As the nerve always transmits the same impression, then if the vascular apparatus—that is, the strings of the membrana basilaris, are differently tuned, the nerve produces in a higher pitch a deeper tone, while a deeper pitch produces a higher tone. The last ground for the false hearing is situated in the labyrinth, while the primary is often a disease of the middle ear. According to Alt, neuræsthenia, hysteria, fatigue of the ear are of considerable importance.

SUCKSTORFF.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY AND TREATMENT.

- 309. ECKSTEIN. Injections of paraffin in nasal and facial plastic surgery. *Berl. klin. Wochenschr.*, 1906, Nos. 31, 32.
- 310. MENIER. Anosmia and Parkinson's disease. *Archivio italiano di otol.*, etc., vol. xvii., 5, 1906.
- 311. WELEMINSKY. Therapeutic reports. *Arch. f. Laryng.*, vol. xviii., 3.
- 312. KIEFFER. The relation between tonsillitis and acute articular rheumatism, with particular reference to the prophylaxis of post-anginal rheumatism. *Am. Med.*, September, 1906.
- 313. MORAWECK and HALL. The use of sheet paraffin in lesions of the nose and throat. *Jour. American Medical Ass'n*, February 24, 1906.
- 314. DUFOUR. New and most efficacious method for removing faucial tonsils. *Virginia Medical Semi-Monthly*, December 22, 1905.
- 315. WILSON. Some anatomical and physiological considerations of the faucial tonsil. *Jour. American Med. Ass'n*, May 26, 1906.
- 316. RHODES. Treatment of sarcoma of the naso-pharynx by injections of adrenalin. *Jour. American Medical Ass'n*, August 11, 1906.
- 317. KERR. A new shield for use in nose and throat examinations. *Jour. Am. Med. Ass'n*, September 8, 1906.
- 309. ECKSTEIN. Injections of paraffin in nasal and facial plastic surgery.

The unpleasant accidents which have occurred in paraffin injections are described, such as pulmonary emboli, blindness, skin necrosis, paraffin migration. The author is convinced

that by the use of his hard paraffin, of over 50° melting point, all of these accidents can be avoided. A short description follows of the histological examination as to the future of paraffin in the living body, with the statement that paraffin of high melting point probably is not all absorbed. A marked improvement in cosmetic results has been obtained because in certain cases the paraffin is not injected but implanted. It is introduced in larger or smaller particles through a cutaneous incision, then pushed into shape with the fingers or with a pair of forceps where it is needed. The indications and technique of this procedure are described.

This paper is an exhaustive presentation of Eckstein's well-known standpoint as to the question of paraffin injections. It should be read by everybody who is interested along this line.

MUELLER.

310. MENIER. *Anosmia and Parkinson's disease.*

In three patients suffering from paralysis agitans the author demonstrated complete anaesthesia of the olfactory nerves. In addition the nasal mucous membrane was insensitive.

RIMINI.

311. WELEMINSKY. *Therapeutic reports.*

This paper treats of the tamponade of the nose and drainage of a peritonsillar abscess with paraffin gauze, as practised in Hajek's clinic. In treating ozæna with paraffin injections a small incision is made in the mucous membrane of the septum after a Schleich injection, a pocket of mucous membrane is detached, and paraffin is injected. The site of incision is closed by the packing in order to prevent the escape of the paraffin. To drain the maxillary antrum, a new trocar is recommended, with a canula which, after puncture, remains for some time in the opening in the lower meatus. To cauterize the lower turbinal Schleich's solution is first injected, a small scalpel is introduced into the mucous membrane, and the mucosa is undermined. In this tract a small cautery burner is then introduced. There is hardly any reaction after this method. In congestive conditions of the anterior end of the middle turbinal, scarifications are recommended.

VON EICKEN.

312. KIEFFER. *The relation between tonsillitis and acute articular rheumatism, with particular reference to the prophylaxis of post-anginal rheumatism.*

In all, 2275 cases were diagnosed as acute tonsillitis, the large majority being classed as follicular and bilateral. In the same period of time 1293 cases of articular rheumatism were traced in which there was absolute record of preceding tonsillitis, or 21.3 per cent. The treatment was divided into two series; the first class were treated in the usual way, the average duration of the disease being six days. Superficial and deep ulceration of the tonsils was common, and 15 per cent. developed acute articular rheumatism later. In the second series, in addition to the usual local and constitutional treatment, acetyl-salicylic acid powder was freely applied to the tonsils three times daily, with an average duration of the disease of three days. No swellings, no severe constitutional symptoms, no tendency to erosion of the tonsils were observed. No case of rheumatism developed in this series of cases.

CLEMENS.

313. MORAWECK and HALL. *The use of sheet paraffin in lesions of the nose and throat.*

Splints made of dentist's paraffin are recommended in nasal surgery to prevent adhesions. It is easily cut and bent in any desired shape and is soft enough to conform to the shape of the space in which it is placed. If it is handled with clean hands and shaped with clean instruments and the whole surface thoroughly scraped just before introduction, it is not necessary to place it in irritating antiseptic solutions. Besides being less painful and inconvenient than either the gauze tampon or Bernay splint, it is found to be more satisfactory in preventing adhesions. The splints are used in about 50 per cent. of the author's work.

CLEMENS.

314. DUFOUR. *New and most efficacious method for removing faucial tonsils.*

The proper method to remove faucial tonsils, whether enlarged or not, is to enucleate them. The method employed in children is to give an anaesthetic, insert a mouth gag, and with the proper instruments loosen the tonsil from any attachment from the pillars; then, with tenaculum or forceps

pull the tonsil well out of its bed, slip a wire of a snare made for the purpose over it, and with one stroke enucleate it. The shock of the operation is said to be slight and recovery rapid.

CLEMENS.

315. WILSON. *Some anatomical and physiological considerations of the faucial tonsil.*

After describing the palatine ring and the normal proportions and development of the tonsils, Wilson states that the supply comes from the facial artery, either through a distinct tonsillar artery or more commonly from the tonsillar branch of the facial, and not from the lingual, as stated by Gray. The tonsils reach their full development about the fifth year. There is little support for the opinion that it is a vestigial organ. Respecting the function and secretion of the tonsil, it is considered to be actively engaged in the production of lymphocytes, which pass directly into the lymphatics or through the mucous membrane into the mouth. He thinks more consideration should be given to the effect of the diseases demanding increased leucocytosis on the tonsillar exudations in the mouth, and the relation of this to the disturbances of the buccal and gastric functions.

CLEMENS.

316. RHODES. *Treatment of sarcoma of the naso-pharynx, by injections of adrenalin.*

The author seems to think that this method merits trial, especially in cases of carcinomata and sarcomata of the nose and throat, in which an unfavorable prognosis must almost without exception be made; and the earlier it can be resorted to the better. He believes that it may replace morphine as an analgesic, and while we have no proof of its being curative in its action as yet, it has a palliative effect. In operable cases, in which delay would be dangerous, a resort to surgery, as heretofore, should be the rule.

CLEMENS.

317. KERR. *A new shield for use in nose and throat examinations.*

The shield is made of celluloid, is 7 x 9 inches, and is attached to the posterior surface of the head mirror by four clamps fastened to its surface. The margins are protected by thin strips of aluminum. A hole is made in the shield in the proper

place for the shank of the mirror, and this can be at either side of the centre line, according to which side of the light the patient is placed. It can be easily detached from the mirror to be cleaned, or in case the mirror is to be used without the shield.

CLEMENS.

b.—OZÆNA.

318. BLAU. *The treatment of ozæna with paraffin injections.* *Arch. f. Laryng.*, vol. xviii., 3.

319. FEIN. *Ozæna and the congestive hyperæmia of Bier.* *Wien. klin. Wochenschr.*, No. 31, 1906.

320. RÉTHI. *Ozæna and congestive treatment.* *Wien. klin. Wochenschr.*, No. 39, 1906.

318. BLAU. *The treatment of ozæna with paraffin injections.*

Ten cases of ozæna treated with paraffin injections are reported, in which the injection was performed from one to two years ago. A treatment in the true sense of the word is not obtained, but the unpleasant symptoms are relieved. In five cases, the improvement was so marked that no scab or unpleasant odor was present. In three cases there was a moderate formation of scabs without odor. In two there was no improvement.

VON EICKEN.

319. FEIN. *Ozæna and the congestive hyperæmia of Bier.*

The experiments which this author made with congestions of the neck produced a congestion also in the nasal mucous membrane, though this was not so intense as to produce any influence upon the existing conditions. He then tried to compress the veins by withdrawing the blood from the interior of the nose. This was made possible by the introduction of an instrument like Belocq's tamponade. Four cases were treated without any promising results.

WANNER.

320. RÉTHI. *Ozæna and congestive treatment.*

Experiments were made partly with aspiration, partly with compression of the blood-vessels. In general unsatisfactory results were obtained, as by the preceding investigator.

WANNER.

c.—TUMORS OF THE NOSE.

321. KILLIAN. *On the origin of solitary mucoid polypi of the naso-pharynx.* *Ann. des mal. de l'oreille*, etc., May, 1906.

322. VACHER and GRAS. *A case of epithelio-sarcoma of the ethmoid.*
Ann. des mal. de l'oreille, etc., March, 1906.

323. KIENBOECK. *X-ray treatment of sarcoma.* *Allgemeine Wien. med. Zeitung, Nos. 27-35, 1906.*

324. DENKER. *A new method of operating for malignant nasal tumors.* *Münchn. med. Wochenschr., 1906, No. 20.*

321. KILLIAN. *On the origin of solitary mucoid polypi of the naso-pharynx.*

With the aid of his nasal speculum, Killian found that the pedicle of this remarkable cystic polyp issued out of the accessory opening of the maxillary antrum. The microscopic examination of this part showed that it is not a true pedicle but a part of a cystic wall. This shows that these cases are cases of large cystic polypi, half of which are in the maxillary antrum and half in the naso-pharynx.

BOENNINGHAUS.

322. VACHER and GRAS. *A case of epithelio-sarcoma of the ethmoid.*

The tumor, in an old man, had invaded the left maxillary and the sphenoidal and both frontal sinuses. It was removed after resection of the frontal process of the superior maxilla. There was no microscopic examination and no subsequent observation.

BOENNINGHAUS.

323. KIENBOECK. *X-ray treatment of sarcoma.*

Four cases of sarcoma of the nose and of the accessory cavities were treated, after numerous operations, by radiotherapy. There was transient diminution of pain, in one the tumor decreased, but in all four there was no cure.

WANNER.

324. DENKER. *A new method of operating for malignant nasal tumors.*

Denker has used the following method, in certain cases, to remove malignant tumors of the lateral wall of the nose: Incision of the mucous membrane above the teeth. Retraction of the soft parts on the face of the skull as well as the lower and middle meatus. Removal of the lower turbinal with scissors. A broad removal of the facial wall of the superior maxillary cavity. Resection of the bony nasal wall of this cavity with forceps and chisel. The mucosa of the

lateral wall of the nose is then repeatedly cut away with a blunt-pointed knife. The ethmoid labyrinth and the sphenoidal cavity can then be easily cleaned out. The incision in the mucous membrane is sutured. There never had been any disturbance in the lachrymal apparatus. SCHEIBE.

d.—NASAL SEPTUM.

325. COZZOLINO. *On granuloma of the nasal septum.* *La Pratica oto-rino-laringoiatrica*, No. 4, 1906.

326. ONODI. *The resection of the nasal septum in primary tuberculosis.* *Deutsche med. Wochenschr.*, No. 29, 1906.

325. COZZOLINO. *On granuloma of the nasal septum.*

This is a clinical report with a histological examination. As the small tumor of the nasal septum was always preceded by a severe epistaxis, and from the condition found at the microscopic examination, the author believes that vasomotor influences play an important part in the causation of this granuloma of the septum.

RIMINI.

326. ONODI. *The resection of the nasal septum in primary tuberculosis.*

Based on the result of the histological examination of an ulcer of the septum, suspicious of carcinoma, the author operated as follows. The process was exposed by a median incision under local anaesthesia, then a part of the septum, 38mm long, 30mm broad, and 12mm thick, was resected. The wound healed and there was no recurrence. Subsequent examination of the extirpated ulcers showed that the condition was not carcinoma, but apparently primary tuberculosis. The other methods of treatment in these cases are then described. In the author's opinion, if a diseased area can be sufficiently surveyed and if it is not too extensive, energetic endonasal curettage is indicated. If not, the operation as just described should be practised.

NOLTENIUS.

e.—ACCESSORY CAVITIES.

327. WEISSMANN and FIOCRE. *The maxillary sinus and its inflammation in the new-born.* *Annales des mal. de l'oreille*, etc., September, 1906.

328. TRÉTROP. *Sinusitis and osteomyelitis of the maxillary bone.* *La presse oto-laryngologique Belge*, book 8.

329. BÖRGER. On the modification of Friedrich's operation in chronic empyema of the maxillary antrum. *Arch. f. Laryngol.*, vol. xviii., 3.
330. IWANOW. On operations on the maxillary antrum. *Eshemesjatschnik uschnych, nossowych i gorlowych bolesnej*, June, 1906.
331. BUCHER. On the radical operation for chronic maxillary empyema. *M. f. O.*, 1906, No. 6.
332. NIELSEN. A case of chronic empyema of the maxillary antrum without nasal symptoms. *Ugeskrift for Læger*, 1906, No. 22.
333. HOFMANN. An inflammatory affection of the orbit and of the eye, following suppurations in the accessory cavities and in the nose. *Z. f. Augenheilk.*, xvi.
334. MEISSNER. A case of monolateral empyema of the accessory cavities of the nose with involvement of the eye. *Wien. med. Wochenschr.*, No. 32, 1906.
335. SCHMIEGELOW. On the relation between affections of the nose and of the eye. *Arch. f. Laryngol.*, vol. xviii., 3.
336. BAUMGARTEN. Acute inflammations of the eye following acute nasal disease. *M. f. O.*, 1906, No. 5.
337. SHIRMINSKI. On acute inflammation of the maxillary antrum and of the frontal sinus. *Eshemesjatschnik uschnych, gorlowych i nossowych bolesnej*, September, 1906.
338. UFFENRODE. On Sondermann's suction method in diseases of the accessory cavities. *Münchn. med. Wochenschr.*, 1906, No. 24.
339. HEERMANN. On the conservative treatment of empyemata of the accessory sinuses. *Münchn. med. Wochenschr.*, 1906, No. 34.
340. JACQUES. On the operation for chronic frontal sinusitis. *Ann. des mal. de l'oreille*, etc., February, 1906.
341. RITTER. A new method to preserve the anterior wall of the frontal sinus in the radical operation of chronic frontal sinusitis. *Deutsche med. Wochenschr.*, No. 32, 1906.
342. CLAOUÉ. Osteomyelitis of the skull in the course of an empyema of the maxillary and frontal sinuses. *Ann. des mal. de l'oreille*, etc., April, 1906.
343. WHEELOCK. Abscess of maxillary antrum causing symptoms of acute articular rheumatism. *American Medicine*, February 17, 1906.
344. JACK. Report of four cases showing the result of Killian's operation. *Jour. Am. Med. Ass'n*, July 21, 1906.
327. WEISSMANN and FIOCIRE. *The maxillary sinus and its inflammation in the new-born.*

The author adds one more case to the five previously mentioned in literature. These six cases show that, when, in a new-born child during the first weeks or months, an abscess develops in the cheek with discharge of pus from the nose and swelling of the gums, there is a purulent periostitis of the

superior maxilla and an empyema of the maxillary antrum. The etiology is not defined: in one case, pressure of the forceps during birth; in two, ulceration of the nipple in the mother. Treatment is a broad incision, with curettage of the granulations and of the sequestrum.

BOENNINGHAUS.

328. TRÉTROP. *Sinusitis and osteomyelitis of the maxillary bone.*

Two cases of osteomyelitis of the superior maxilla are reported, which is a serious disease likely to be acquired and difficult to treat. The treatment consists in drainage, anti-septic irrigation, removal of the sequestrum, or an extensive operation from the anterior surface.

BRANDT.

329. BÖRGER. *On the modification of Friedrich's operation in chronic empyema of the maxillary antrum.*

This modification is as follows: The incision is made within the vestibule of the mouth; the mucosa of the external surface of the lower meatus is separated by packing. Then the nasal crust and the part of the bone which forms the pyriform aperture, and a large part of the anterior wall of the maxillary cavity is removed. Then the internal wall of the antrum, near the lower meatus, is resected. The diseased mucous membrane is removed, and the mucosa of the lower meatus furnishes a flap which is turned into the antrum. Sometimes a part of the lower turbinal is removed. The wound is packed. The cases were usually complicated with an empyema of the ethmoid cells.

VON EICKEN.

330. IWANOW. *On operations on the maxillary antrum.*

According to this author, the most complete operation suggested for the superior maxilla is that of Denker. In four cases it has given good results.

SACHER.

331. BUCHER. *On the radical operation for chronic maxillary empyema.*

Report of 15 cases of chronic empyema of the maxillary antrum from Jurasz's clinic, which have been operated upon by Jurasz's method, from the alveolus. It is essential that the palate is shallow and that the alveolar process is broad. The cases of dental empyema, and especially those where a defect in the teeth is present, are applicable.

WITTMAACK.

332. NIELSEN. *A case of chronic empyema of the maxillary antrum without nasal symptoms.*

A swelling of the canine fossa had existed for five years and now it was fluctuating. There was a fistula in the region of the second molar tooth. On incision a fistula was found leading into the maxillary sinus. This was enlarged and a serous non-fetid fluid relieved. The irrigating fluid did not enter into the nose. The case can therefore be regarded as a dentigerous cyst.

MÖLLER.

333. HOFMANN. *An inflammatory affection of the orbit and of the eye, following suppurations in the accessory cavities and in the nose.*

Complete description of the anatomical paths along which a suppuration extends from the nose to the eye, and a general description of the literature, with the addition of certain personal observations.

BRUEHL.

334. MEISSNER. *A case of monolateral empyema of the accessory cavities of the nose, with involvement of the eye.*

The patient, a woman thirty-seven years of age, had frequently complained of right-sided headache for one year. The right eye became suddenly blind. There was no exophthalmos. The diagnosis of retrobulbar neuritis was made. Three days later the right upper lid became swollen, the upper orbital margin tender, and a round prominence appeared at the inner and upper angle. Examination of the nose revealed an empyema of the right maxillary antrum. After removing a hypertrophy of the turbinals the vision improved, though the improvement was not marked until after the ethmoid cells and the frontal sinus had been exposed.

WANNER.

335. SCHMIEGELOW. *On the relation between affections of the nose and of the eye.*

This is a review of the cases of retrobulbar optic neuritis found in literature which were caused by suppurations in the accessory cavities of the nose. The personal observations are added, which are of interest, because the pus in the upper meatus was not demonstrated until after the olfactory fissure had been thoroughly cocainized. The neuritis in both cases healed after the diseased cells had been treated.

VON EICKEN.

336. BAUMGARTEN. *Acute inflammations of the eye following acute nasal disease.*

A number of interesting cases are reported in which acute symptoms on the part of the eye followed acute affections of the interior of the nose—one-sided exophthalmos, bilateral chemosis following serous ethmoiditis, chemosis and ulcers of the nasal septum, paresis of the internal rectus and inferior oblique, causing diplopia after affection of the sphenoidal sinus, orbital and supraorbital neuralgia caused by a purulent ethmoidal bulla, exophthalmos and serous inflammation of the sphenoidal cavity. The connection between the affections of the nose and of the eye is clear because the ocular symptoms disappeared immediately upon treating the nose.

WITTMAACK.

337. SHIRMUNSKI. *On acute inflammation of the maxillary antrum and of the frontal sinus.*

Eleven cases are reported. To facilitate the escape of pus adrenalin is used. The pain in the forehead is relieved by bromide of quinine and electric-light treatment. SACHER.

338. UFFENRODE. *On Sondermann's suction method in diseases of the accessory cavities.*

Two cases of suppuration of the superior maxilla in which, after suction, puncture and irrigation always caused more discharge to appear. Therapeutically, therefore, the value of suction is slight; its diagnostic importance the author apparently undervalues.

SCHEIBE.

339. HEERMANN. *On the conservative treatment of empyema of the accessory sinuses.*

Heermann recommends the opening of the accessory cavities from the nose, and describes some instruments of his own. In order to expose the lower meatus, the lower turbinal is temporarily turned up with the aid of Killian's septal forceps. In cleansing the accessory cavities the author always uses suction.

SCHEIBE.

340. JACQUES. *On the operation for chronic frontal sinusitis.*

Jacques believes that one should individualize in selecting

the operation in empyema of the frontal sinus: 1. In small and moderate frontal sinuses,—in other words in most cases,—resection of the anterior wall according to Luc-Ogston, combined with resection of the frontal process of the superior maxilla and of the anterior ethmoidal cells according to Taptas. 2. In large frontal sinuses—that is, in exceptional cases—the operation according to Killian. This standpoint is the one shared by most French rhinologists, and is unquestionably correct.

BOENNINGHAUS.

341. RITTER. *A new method to preserve the anterior wall of the frontal sinus in the radical operation of chronic frontal sinusitis.*

Ritter has operated upon two cases of frontal sinus empyema by first removing the floor of the frontal sinus and then making, at the highest point, another small opening in order to gain access to all parts of the frontal sinus. He prefers this to Killian's method, though in one of the cases a moderate discharge persisted from a small depression.

The reviewer does not share this opinion, but believes that Killian's operation is superior to any as regards thoroughness of operating. Based upon an experience of 50 operations performed according to this method, if the crust of bone is sufficiently broad ($1-1\frac{1}{2}$ cm) the cosmetic result is excellent. If necessary, an injection of paraffin will obviate the depression above this crust.

NOLTENIUS.

342. CLAOUÉ. *Osteomyelitis of the skull in the course of an empyema of the maxillary and frontal sinuses.*

This is a classical case with fatal termination. In an old case of suppuration of the maxillary antrum and of the frontal sinus, the maxillary antrum was operated on according to Caldwell-Luc. Then, slowly, an ascending osteomyelitis of the frontal bone developed, which, notwithstanding numerous operations, continued, and $3\frac{1}{2}$ months later led to death through thrombosis of the longitudinal sinus and an intradural abscess with purulent meningitis.

BOENNINGHAUS.

343. WHEELOCK. *Abscess of maxillary antrum causing symptoms of acute articular rheumatism.*

Wheelock reports a case of pneumococcus infection of the

maxillary antrum which was followed by symptoms of acute articular rheumatism in the knee joint, left shoulder, and elbow. The antrum was opened, and after several washings the case made a rapid recovery.

CLEMENS.

344. JACK. *Report of four cases showing the result of Killian's operation.*

The cases were operated upon for chronic suppurative ethmoiditis with abscess breaking into the orbit. Convalescence was rapid and uncomplicated. The wounds healed by first intention, except in Case 2. Tampons to prevent hemorrhage were removed in twenty-four hours. There was no ethmoid packing and no after treatment, except gentle cleansing of the nose. The supraorbital scar in all the cases is now covered by the eyebrow. The nasal scar is scarcely distinguishable. The contour is preserved by the supraorbital bridge. The results of the X-ray examination have not been satisfactory and its value in skiagraphy is not perfectly determined.

CLEMENS.

f.—OTHER DISEASES OF THE NOSE.

345. ZARNIKO. *On the treatment of hay fever with pollantin.* Berl. klin. Wochenschr., No. 37, 1906.

346. HARBITZ. *A peculiar lesion of the forehead.* Norske magasin for lägevidenskaben, 1906, No. 9.

347. CABOCHE. *Two cases of naso-lachrymal tuberculosis.* Ann. des mal. de l'oreille, etc., September, 1906.

345. ZARNIKO. *On the treatment of hay fever with pollantin.*

Zarniko has studied the answers received in regard to the results of treatment with Dunbar's pollantin in the year 1906. These included 492 cases. Of the 287 European cases, 66 per cent. were treated with an excellent result, 27 per cent. with a moderate result, and 7 per cent. were unimproved. Of the 205 American cases, the percentages were 51.1, 17, and 27.8.

The difference between these numbers and those of the statistics of the Hay Fever Association is difficult to explain. According to the latter, 26.5 per cent. were treated with excellent result, 42.5 per cent. with moderate result, 31 per cent. without result.

The following practical points are of interest: The treatment with pollantin should only be employed prophylactically. Every time only a small amount of powder should be applied; large amounts are not well tolerated by many people. If, notwithstanding proper dosage, unpleasant effect is observed, it is well to try a tube of a different factory number. In doubtful cases, to confirm the diagnosis, it is well to use pollen toxin in the form of the "Aid to the Diagnosis of Hay Fever." The severity of the hay-fever attack is not inversely proportional to the action of the serum.

MUELLER.

346. HARBITZ. *A peculiar lesion of the forehead.*

A man, 30 years of age, during a fight, received the point of an umbrella in his nose. The point was broken off and was extracted by the patient himself. On examination he was a little dazed, there was some bleeding from the nose, and the left eye protruded. During the following days there was some fever, but the patient otherwise seemed pretty well. On the fourth day, stupor, increasing fever, vomiting, coma. Examination of the nose proved without result. On the 12th day, death. Autopsy: fracture of the roof of the nose and of the sphenoidal bone. There was a canal in the left frontal lobe of the brain which extended to the left lateral ventricle. Purulent infiltration at the base of the brain and pus in the ventricles. There is no lesion of the nasal mucous membrane except at the inner surface of the upper turbinal.

JOERGEN MOELLER.

347. CABOCHE. *Two cases of naso-lachrymal tuberculosis.*

In both cases a lachrymal fistula led to an examination of the nose. The septum was found normal, the lower meatus, however, full of tubercular granulations. Care should be taken in examining that part of the nose between the lower turbinal and the lateral wall of the nose, both with the probe and, if necessary, with the aid of a Killian's speculum.

BOENNINGHAUS.

g.—NASOPHARYNX

348. JOHNSTON. *Congenital membrane in the nasopharynx.* *Jour. American Medical Ass'n*, September 1, 1906.

349. LANGE. *Old and new on the question of adenoids.* *M. f. O.*, 1906, No. 9.
350. SCHMIDT. *True papilloma of the nasopharynx.* *Arch. f. Laryng.*, vol. xviii., 3.
351. SEREBRJAKOFF. *On involution of the normal and hyperplastic pharyngeal tonsil.* *Arch. f. Laryng.*, vol. xviii., 3.
352. SUAREZ DE MENDOZA. *On the diagnosis and treatment of adenoid vegetations.* Paris, 1906. Price 5 frs.

348. JOHNSTON. *Congenital membrane in the nasopharynx.* Patient, female, aged 35, complained of dryness of the nasopharynx and great difficulty in removing the secretion. There was constant tinnitus in the left ear. Examination showed the pharynx to be dry and covered with a thick layer of grayish secretion. After cleansing, a distinct membrane was discovered, coming down from the roof of the nasopharynx and extending entirely across the cavity, dividing the space into an anterior and posterior part. The membrane had its origin behind the openings of the Eustachian tubes, neither of which was visible. About the centre of the membrane was a round perforation, extending more to the right than to the left. Through this opening the lower two-thirds of the septum and the turbinates could be seen. The membrane passed downward and became gradually lost on the posterior wall of the soft palate. No specific history could be obtained, and there is no doubt in the mind of the writer that it was congenital. There was no operation. CLEMENS.

349. LANGE. *Old and new on the question of adenoids.* Lange is opposed to the too rapid and too early operations for the removal of adenoid vegetations. The operation should be performed only by experts. Of importance in the treatment of adenoids is the nasopharyngeal catarrh, which should not be overlooked. The general treatment is of importance. The enuresis of children is a neuropathic condition independent of adenoids.

WITTMAACK.

350. SCHMIDT. *True papilloma of the nasopharynx.* The tumor was removed with Beckman's ring knife. Microscopic examination showed it to be a true papilloma.

VON EICKEN.

351. SEREBRJAKOFF. *On involution of the normal and hyperplastic pharyngeal tonsil.*

Statistical examinations have shown that the involution of the normal and of the moderately enlarged pharyngeal tonsil occurs with regularity, beginning with the age of puberty and continuing to the 25th year. The histological process consists in the transformation of the epithelial covering of the adenoid growths to squamous epithelium, when the character of the cylindrical epithelium is lost. The adenoid tissue is rarefied by the appearance of numerous vascular fissures (lymph and blood vessels). The follicles and their germ cell centres are the last to disappear. Associated with the retrogression of these adenoid tissues there is a formation of cysts.

VON EICKEN.

352. SUAREZ DE MENDOZA. *On the diagnosis and treatment of adenoid vegetations.*

This monograph of 207 pages treats the subject in an enthusiastic and exhaustive manner. The author thinks that it is extremely difficult to define the influence that adenoid vegetations have on the skull, in the development of the thorax and other distant organs. He is opposed to narcosis, especially bromid of ethyl, because a number of fatal cases have occurred, to his own knowledge, which were not published.

OPPIKOFER.

PHARYNX AND MOUTH.

353. CASSELBERRY. *The indications for surgical interference in disease of the faucial tonsils and the methods of choice in operating; an analysis of 480 cases.* *Laryngoscope*, June, 1906.

354. CONKEY. *Sarcoma of both faucial tonsils.* *Laryngoscope*, June, 1906.

355. STEIN. *The indications for the surgical removal of the tonsils and the best method for doing so.* *Chicago Medical Recorder*, August 15, 1906.

356. SMITH, C. M. *A case of tonsillar chancre.* *Jour. Cutaneous Diseases*, January, 1906.

357. GERSON. *On the treatment of angina lacunaris.* *Med. Klinik*, 1906, No. 39.

358. PULVERMACHER. *On the etiology of leukoplakia of the mouth.* *Wien. klinische therapeutische Wochenschr.*, No. 39, 1906.

353. CASSELBERRY. *The indications for surgical interference in disease of the faucial tonsils and the methods of choice in operating; an analysis of 480 cases.*

Indications for operating are both systemic and local. Certain types of rheumatism, endocarditis, nephritis, and phlebitis indicate that the tonsils serve as portals of infection. The occurrence of nephritis has been repeatedly observed to follow tonsillitis, and, while it is usually temporary, albuminuria with casts in one case persisted for years. Cervical adenitis in any degree of persistency must be regarded as an indication for immediate tonsillectomy. In 277 cases under 14 years of age (165 of which had ether anaesthesia, and 112 had local anaesthesia) no case of unusual hemorrhage occurred. The ratio of recurrences in the ether series is 1:6 and in the cocaine series 1:4. The recurrences were in no sense hypertrophic but more in the form of troublesome tonsillar disease. In 203, mostly double operations, in the adult, serious hemorrhage occurred in 14. The author describes his method of operation and the instruments used.

CLEMENS.

354. CONKEY. *Sarcoma of both faucial tonsils.*

Case, aged 52, female, had enlarged tonsils, pearly white in color, glistening and lobulated. Upon the right tonsil there was an ulceration as large as a dime. Large and increasing doses of the iodide with a $\frac{1}{8}$ of hydrarg. bichlor. failed to make any favorable impression on the course of the disease. After curetting, both tonsils rapidly increased in size and the cervical glands on both sides became enlarged. The hypertrophies were then removed with the galvano-cautery, and at the time a large mass of similar appearance was discovered at the base of the tongue. This was also destroyed by the cautery. The surfaces since operating have been subjected to the X-ray treatment and nothing seems to have been accomplished thereby but a slight retarding of the pathological process.

CLEMENS.

355. STEIN. *The indications for the surgical removal of the tonsils and the best method for doing so.*

The best method is considered to be the one which insures the possibility of the removal of all the gland. The method

used is one that combines dissection and the tonsillotome. The author proceeds as follows: After the tonsil and faucial pillars have been anæsthetized, the gland is dissected from its attachments. To do this thoroughly, the gland must be deeply and firmly engaged in tenaculum forceps, one set of prongs in the highest accessible part and the other set deeply buried into its base. Traction is made inward, toward the mouth, downward and backward, which is aided by a backward rotation of the engaged forceps. The attachments are all now drawn taut, and with a small bistoury or curved scissors incision is commenced well up in the epitonsillar fossa and is carried down along the anterior edge of the palato-glossal muscle, hugging the capsule and avoiding muscular fibres. Posterior attachments are severed in the same manner, by reversing the rotation of the engaged forceps to a forward position. Special effort should be made to liberate the large mass of the gland tucked away in the epitonsillar fossa. The tonsillotome is now made use of to encircle the gland and, with strong traction with the forceps, the remaining attachments are severed at one stroke. Curved scissors, or the cold or electric cautery loop, may be used instead of the tonsillotome, with success.

CLEMENS.

356. C. M. SMITH. *A case of tonsillar chancre.*

Male, aged 26 years, had sore throat for a month. There was a marked roseola generally distributed over the body, but no evidence of any sore about the genitals, or prominent enlargement of the inguinal glands. On the right tonsil was a deep ulceration surrounded by a zone of redness, infiltration and the glands under the angle of the jaw were distinctly enlarged. No history of infection could be obtained.

CLEMENS.

357. GERSON. *On the treatment of angina lacunaris.*

Crypts in the tonsils are probed and cauterized with a probe dipped in carbolic acid or other caustic agent. BRUEHL.

358. PULVERMACHER. *On the etiology of leukoplakia of the mouth.*

Of 54 cases one only was a female. 42.6 per cent. of the

cases were syphilitic. In addition, the indulgence in tobacco plays an important rôle in the etiology. The same result as in the combination of syphilis and tobacco can also be obtained by an increased dose of tobacco.

The combination with a certain affection of the skin is unquestionable. This is characterized by an increased horny development; pachydermia of the larynx, closely related to leukoplakia, and the use of mercury have been shown to be of etiological importance.

WANNER.

BOOK REVIEWS.

I.—**Chirurgie Oto-Rhino-Laryngologique.** By GEORGES LAURENS. (*Traité de médecine opératoire et de thérapeutique chirurgicale*, published under the direction of Paul Berger and Henri Hartmann.) Paris: G. Steinheil, 1906. 976 pages. Price 30 francs.

The part in this "Treatise on Operative Medicine and Surgical Treatment" devoted to the ear, nose, and throat is a formidable volume of nearly 1000 pages. The size and elaborateness testify to the surgical development of these specialties in recent years. As the author states in the preface, the contemporary school of Otology has profited by a surgical education, and that, while formerly the specialist operated rarely and then only by the natural ways and the surgeon only by the external routes, the up-to-date otologist must be conversant with both methods.

The operative procedures are systematically described and usually preceded by a description of the methods of examination. The indications follow for rational and conservative treatment. Due attention is given to the subject of after-treatment which, as the author correctly states, requires specialistic care.

In the introduction general information is given on illumination, anaesthesia, asepsis, and hemostasis. This agrees with the teachings of general surgery slightly modified according to French usage. The prolixity of instruments in this specialty the author deplores, suggesting sensibly that our aim should be to simplify and reduce the armamentarium. Under hemostasis, mention is made of an original method of blood aspiration. This, applicable especially to mastoid work, consists in the suction of blood during operation by means of the

vacuum principle, similar to the procedure followed by dentists in removing saliva.

To simply draw attention to a few features of this excellent book, the surgery of the labyrinth is fully described. In the after-treatment of the tympano-antral exenteration, packing is used for 1 or 2 dressings and then boric acid insufflation according to Eemann. A short chapter is devoted to vertebro-hypocranial operations in otitic suppurations at the base of the skull. There are 3 elective areas for the propagation of pus from the mastoid to the base of the skull: (1) the region of the tip; (2) the area between the sinus and the posterior canal wall below the antrum; (3) the sigmoid sulcus and cerebellar dura. The operation for exposing the jugular bulb is clearly described. An important feature are the illustrations which are carefully selected and are well drawn. The book is instructive and complete.

A. K.

II.—Some Points in the Surgery of the Brain and its Membranes. By C. A. BALLANCE, M.V.O., M.S., etc. London: Macmillan & Co., 1907.

This is the subject of the Lettsomian Lectures for 1906, and considers the surgery of the cerebral membranes, abscess and tumor of the brain. A more or less complete picture of these conditions is given, together with modern views on the pathology, brain localization, and treatment. The text is enriched by pertinent case-histories, many of them personally observed, and by excellent illustrations.

In chronic suppuration in the nasal accessory cavities, just as in temporal bone suppuration, Mr. Ballance favors complete ablation of diseased bone. If this is neglected, the opportunity for a preventive operation has gone by and meningitis may result; even then surgery is not helpless though the chances for recovery are much lessened. The results obtained in the operative treatment of purulent meningitis are encouraging, and the author thinks that "we are no longer justified in regarding these cases as hopelessly lost."

In the treatment of otitic brain abscess, Mr. Ballance recommends that the pathway of the infective process through the bone should be followed, and the brain exposed at the pos-

terior wall of the antrum or at the tegmen. Drainage should be attempted through the narrow portion or stalk of the abscess. If necessary, a counter opening should be made, and if time permits, after opening the dura the wound is packed with gauze to isolate the brain area by adhesions where the incision is to be made. To incise the brain nothing is better than a narrow, long knife. "The operation for brain abscess has advanced a good stage towards perfection" and "the future is bright with promise."

These lectures written in a most attractive style and coming from such an authoritative source will be studied with pleasure and profit by every one interested in cerebral surgery.

A. K.

III.—Surgical Anatomy of the Temporal Bone. By ARTHUR H. CHEATLE, F.R.C.S., etc. London: Churchill, 1907. 131 pages.

In 1906 Mr. Arthur Cheatle delivered the Hunterian Lectures on the Surgical Anatomy of the Temporal Bone, based on 500 anatomic specimens. These lectures are now printed in book form, with many excellent illustrations of the bone specimens.

There is no part of Otology which arouses so much interest in every one as the anatomy of that remarkable structure—the temporal bone, and this masterly presentation of the subject will serve to refresh many points in the memory of the busy aural practitioner and undoubtedly suggest many new viewpoints. For these lectures do not consist only in a description of anatomic peculiarities, but everywhere points of the greatest practical bearing are constantly brought forward.

The book is arranged as follows: Lecture I: The temporal bone at birth. The surgical anatomy of the labyrinth. Lecture II: Superficial changes in the bone during growth. The relation of the lateral sinus to the surface. Consistence of the outer antral wall and mastoid process. Variations in the antrum. Variations in the middle ear proper. Lecture III: The surgical importance of the antrum. Guides to the antrum. The facial nerve. The petro-squamosal sinus. Division of the auditory nerve, etc.

A. K.

Fig. 1.

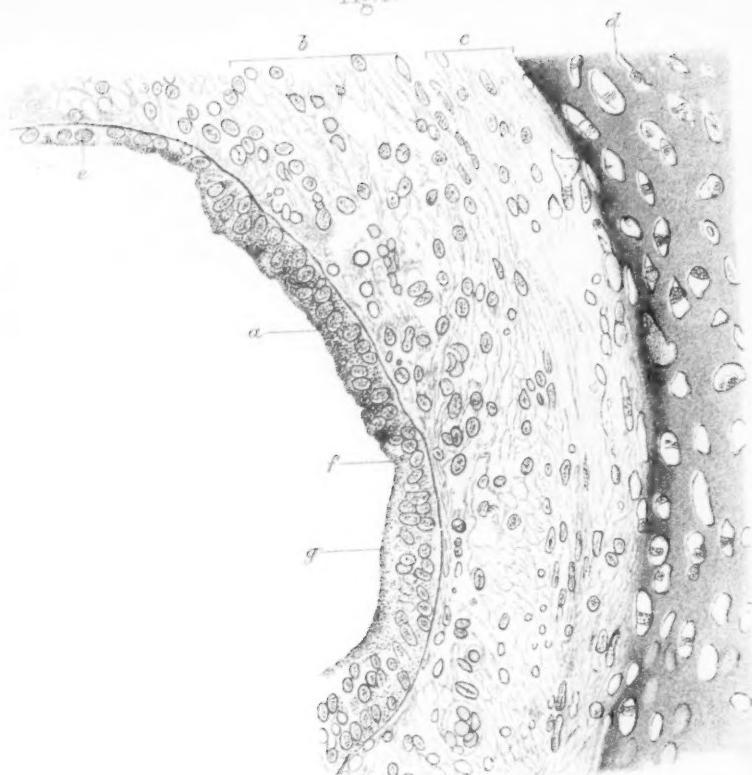
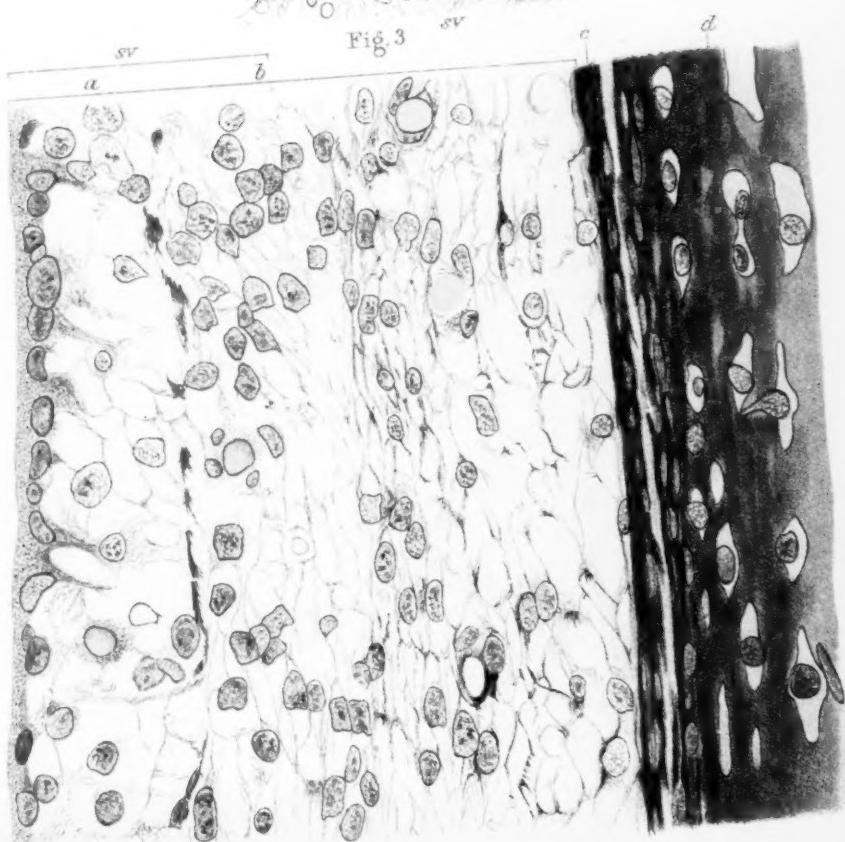


Fig. 3





Tab. A.

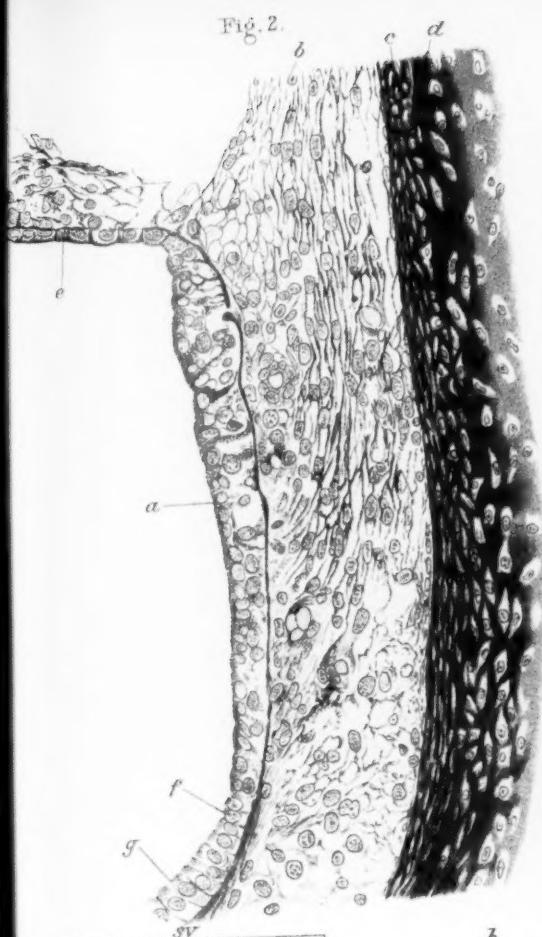


Fig. 4.

